COAL AGE

Vol. 10 NEW YORK, JULY 1, 1916 No. 1

The Management of Men

Handling workmen is like shaping iron. We must work with the habits of the metal and never hammer it cold. There is always a reason behind carelessness and discontent. The manager must discover the grain and fiber of his men. Enthusiasm is the fire that heats the raw material. At the proper instant the men are shaped out of old habits into the new ones that have been planned.

WAGES must be paid only for value received. If success is the aim of a company, then each dollar paid out must return its dividend. A scant wage buys scant service. Coal concerns should arrange in some way to pay increased wages for increased output whenever and wherever such a thing is possible.

The employee who works down to his pay envelope should be investigated. The only workman worth while is the one who will appreciate more wages by giving more in ambition, loyalty and efficiency.

While we are talking of wages, there's the question of individual increases. Every manager should have some quickly available record of each employee's work. The figures should show plainly the workman's attendance on his job, also his efficiency as indicated by output or otherwise. It is a good plan to be able to discover easily whether a man is earning more or less than the wages paid him.

Tardiness is destructive to efficiency. The time-clock must be backed up by psychology. Chronic "lates" and "slow starters" may soon transform a small net profit into a deficit. Docking, fines and suspension are not always advisable. Encouragement of punctuality by a system of rewards is a good plan. Promotions cannot reach down to every workman. Cash premiums as low as 2c. for each day's perfect score sometimes bring results. In the case of salaried employees it may be well to base vacations on the workman's record in the timekeeper's office.

A common problem of management is to get rules read and obeyed. Here are a few suggestions: Rules must be short and concise; they must be interestingly written in a way that will appeal to each workman and be remembered by him. Stereotyped forms are bad. Notices on cardboard, properly posted and frequently changed, attract attention. Every new employee should be compelled to sign a receipt for the company's book of instructions; at the same time he should agree to read and follow the rules. This plan may save a company the loss of a heavy damage suit. Don't forget, however, that a two- or three-minute address to the men by the manager, when changes are to be made in the existing mine practice, will produce better results than any set of rules. Personal contact counts.

Behind winning team play on the part of company officials and men are months of drill. In every mine that stands for output will be found this same coöperative spirit—the manager and foremen stand with the men. Records are made only where and when there is something to fight for. Arrange a real reward for real service and then watch things hum.

Ideas and Suggestions

Observations of a Foreman

By A. B. Spencer*

After seven years' practical experience as foreman in several mines in West Virginia, I came to the conclusion that the foreigners can be made better employees by fair treatment than by the usual tyrannical abuse. The foreman can do more to develop them than any other officer of the company, but to do so he must exercise sobriety, kindness and firmness.

He must see that his actions are just, he must not be too hasty, and due consideration must be given every question that arises if he would establish confidence with this class of men. They should be dealt with honestly; every little detail should have his attention, and his handling of it should manifest his interest in the miners' welfare as well as the company's business.

Do not make a practice of "snapping" off a miner's question because the motor is off the track or a trackman has neglected some of his work. Get the motor on the track as quickly and quietly as possible, repair the damage and afterward have a private talk with whoever is to blame. If you have to do any discharging, do it quietly and do not be the first to spread the report around the mine the next day—the men will find it out soon enough.

Avoid drinking with the men. They will think just as much of you if you refuse to take a drink with them if they find out you do not make any discriminations, but treat them all alike. Every time you take a drink with a man, he expects tenfold in return, and if his expectations are not realized, he will make a special visit to the office to tell "Mr. Super" all about it with exaggerations.

Value of Abuse Rises with Its Infrequency

Be kind and never fail to speak to a man when you meet him, no matter how often this may be. When a miner tells you that the fellow in the next room is getting more cars than he is, or that his place is wet and that he must have more money, or that he cannot work under a bad piece of draw slate—there is no advantage in being harsh or in trying out the resources of your vocabulary.

It is just as easy to make the man understand just what you intend to do or what you do not intend to do, what is fair and what is not fair, without swearing at him. If occasion should occur when you feel it necessary to use your emphatic expressions, the effect on the employees is noticeable because it is unfamiliar. If there is any virtue in profanity, it is in these few rare cases, although I am of the opinion it does not help matters at any time.

Avoid letting personal likes and dislikes influence your actions in any matter. That a foreman likes one man's disposition and dislikes that of another does not warrant him in showing any partiality whatever to the former. Rather than err in this, I have often compelled myself to be more than ordinarily lenient to an employee for whom I had no respect whatever.

Many foremen with whom I have come in contact rely quite freely on the expedient of a flowery promise to the miner, made while taking a drink. They have no intention whatever of keeping to their little agreement. When payday arrives, John comes around with his statement, short the 20 hr. that he was promised for the cleaning up of a fall that really only took him 3 hr. A few instances like this and the foreman is considered a rogue and a thief by 90 per cent. of the employees. This accounts for most of the troubles and complaints at the office on payday.

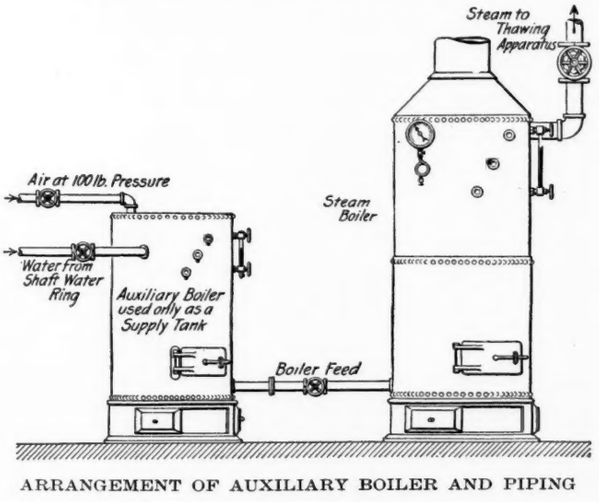
System is the key to success as much in mining as any other industry, and the foreigner is the most difficult problem to handle. All employees should be given the means of checking up their tonnage or hours worked and be shown by a posted sheet that the foreman's promises have been fulfilled, and these sheets should be posted in time for any correction to be made before the payrolls are completed.

*Superintendent, Gage Coal and Coke Co., Junior, W. Va.

An Unusual Method of Boiler Feeding

By F. D. Buffum*

When concreting a mine shaft in freezing weather some time ago, I used steam for warming the water and thawing sand and rock. This was furnished by a small



ARRANGEMENT OF AUXILIARY BOILER AND PIPING

boiler which took water pumped from a water-ring in the shaft.

In order to save occasional injector troubles, a small vertical boiler was set beside the first and the water piped from the shaft to it. An air line was connected to its top, and another pipe led from its bottom to the steam boiler. Each pipe line was of course supplied with a valve. The operation of the device was as follows:

The small boiler being filled with water, the valve in the water-supply line was closed, as were also the try-

*Boswell, Penn.

cocks, which had been open to allow the air displaced by the water as it rose to escape. The boiler water line valve was then opened, also the air-line valve which admitted air at 100-lb. pressure on top of the water and forced it into the steam boiler, which was under a lower steam pressure. This device never gave any trouble.

It is often the case that water from a shaft is suitable for boiler feeding. In such a case it could be run into a small boiler like the one described, but set above the water line in the steam boilers. A steam line from them could be connected in place of the air line in the case mentioned, thus saving injector or boiler-feed pump troubles. In this scheme there is nothing to prevent the use of a feed-water heater in addition.

While I have not given the matter much thought, it would seem as though in a permanent plant this method would in some cases be better than injectors or boiler-feed pumps. The valves could be grouped conveniently, and by using two tanks, one could be filling while the other was emptying.

Correct Auditing, the Staff of Business Life

The best qualification for an auditor to possess is a high appreciation of the value of principles. This was drilled into me thoroughly by a former boss whose tutelage over a period of several years has been worth far more to me than any other experience in my life's work. For an auditor who does not put principle in his work is a man who may let his company wander unconsciously into all kinds of financial trouble.

It seems a herculean task to get people to believe that a man in the position of auditor can really have anything to do with the destinies of his concern. The popular belief is that everything depends upon the "management"; that is, the boys in the operating end do it all; therefore they get the credit or the blame for whatever comes. I don't want to say anything derogatory to the fellow who directs or turns the wheels, but I would like to help shatter that popular delusion that an auditor is nothing more than a keeper of accounts; for the money of too many good men has been lost on the shoals of failure because the operations of a concern were not primarily consistent with good accounting.

That is bad business and is due to a lack of appreciation of the very first principle of good business—that the cost of producing and selling must be accurately known before the price to be asked for the product in the market can be fixed with safety.

I remember having heard some coal operators at an annual convention, when asked how they arrived at the cost of their product, say: "Oh, we add up all we spend for labor and material plus 10 per cent. for general overhead expense—we don't need any of this high-brow bookkeeping." But the concern represented by the men who gave this definition of their cost accounting was in receivership before the next annual convention.

I asked some others at the same meeting if they were honest enough with themselves and with the owners of the property to put in their cost everything that belonged there, such as a proper depreciation for equipment, provision for taxes, obsolescence of property, something to either take care of or pay for preventing a possible explosion or mine flooding, etc. They were honest enough to admit they didn't and just laughed the question away as if such a serious situation could be met in so light-hearted a manner.

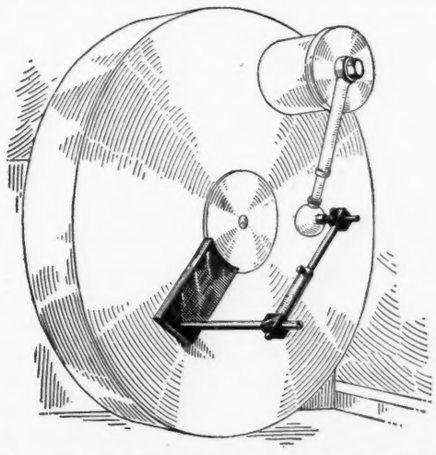
Wrong principles? Sure. Every man or set of men going into the mining game ought to recognize the virtue and excellence of those cardinal principles that govern the accounting for what is done. When we remember that it is stated upon good authority that the entire coal-mining business in this country earns less than 5 per cent. on the investment, we are bound to admit that some folks in the business are playing a losing game, and it ends in disaster just as it does with the individual who won't face the cost of living or make provision for the future.

Adjusting Centrifugal Oiler*

The conditions under which some engines operate make it necessary to disconnect the connecting-rod frequently, and as the crankpins are oiled by centrifugal oilers, it is desirable to have a quick and reliable way to reassemble the oiling device and be sure it will run true, as it is often necessary to replace the connecting-rod in a hurry.

As a means of adjusting the hollow ball of the oiler central with the center of the shaft, a jig is used. It consists of a cast-iron base carefully machined and the arc made to fit on the crankshaft. A hole is drilled square with the base to support a post on which slides a hollow telescoping arm made with the outer end square and drilled to hold the stem of the cone. A setscrew in the square end of the arm allows of adjustment so that the base may seat squarely on the crank disk when the cone is inserted in the ball. The adjustable arm also assists, since the end of the shaft projects through the crank disk. The setscrew allows the arm to be secured at the proper height on the post to allow for the difference in the planes of the surface of the crank disk and the center of the ball when the jig is in use.

In using the jig the center of the ball is first adjusted with the center of the shaft by calipering, using a square. Then the cone of the jig is inserted into the ball, and with



DEVICE FOR CENTERING A CENTRIFUGAL OILER

the setscrews loose, the several parts are adjusted. Thereafter in centering the ball it is only necessary to use the jig as shown, care being taken to prevent springing of the parts when tightening the locknut, as this would throw the parts out of adjustment.

*P. E. Merriam, in "Power."

Some Modern Coal Tipples

By Henry J. Edsall*

SYNOPSIS—The preparation of the coal has given a greater impetus to the installation of thoroughly modern equipment than the mere question of procuring an economically operated plant. Some of the determining factors in the design of uptodate plants are given and descriptions of several typical present-day installations, which will be followed by more in a later issue.

The bituminous-coal miners have, in the past, been content to ship coal just as it came from the mine, that is, as run-of-mine coal without, in most cases, even removing the bone and slate. With a greater production and consequent broader field for selection by the purchasers, the operators found it advisable to be more particular as to the kind of coal they shipped. With increasing competition, the methods of preparation of the coal have also gradually become more and more carefully perfected, so that, with a well-designed modern tipple it is now possible to ship half a dozen different sizes or various combinations of these. In addition the refuse is carefully picked out so that the coal which the consumer finally receives will give good combustion and not cause trouble with clinkers and burned-out grate bars.

The demands of the consumers vary in different localities, especially as to the sizing of the coal, but the sales agents find that their customers are constantly becoming better educated and more insistent in regard to the preparation and sizing. The old tipples are therefore fast disappearing and being replaced by ones of modern design. As a rule this is not a case of reducing the amount of labor or saving money in the cost of handling, though of course any possibilities of improving the methods of handling the mine cars, transferring the coal from the head of the mine to the tipple, handling the empty and loaded railroad cars should be considered when a tipple is rebuilt.

The chief inducement for building a modern tipple, however, is usually a sales proposition almost entirely, and it is largely up to the sales organization to specify how careful a preparation and sizing of the coal is demanded by the trade in the territory covered and also to make some estimate of the increase in the value of the coal which is likely to result from such preparation. From this information the management can judge as to the amount which they feel justified in investing in improvements to accomplish these results.

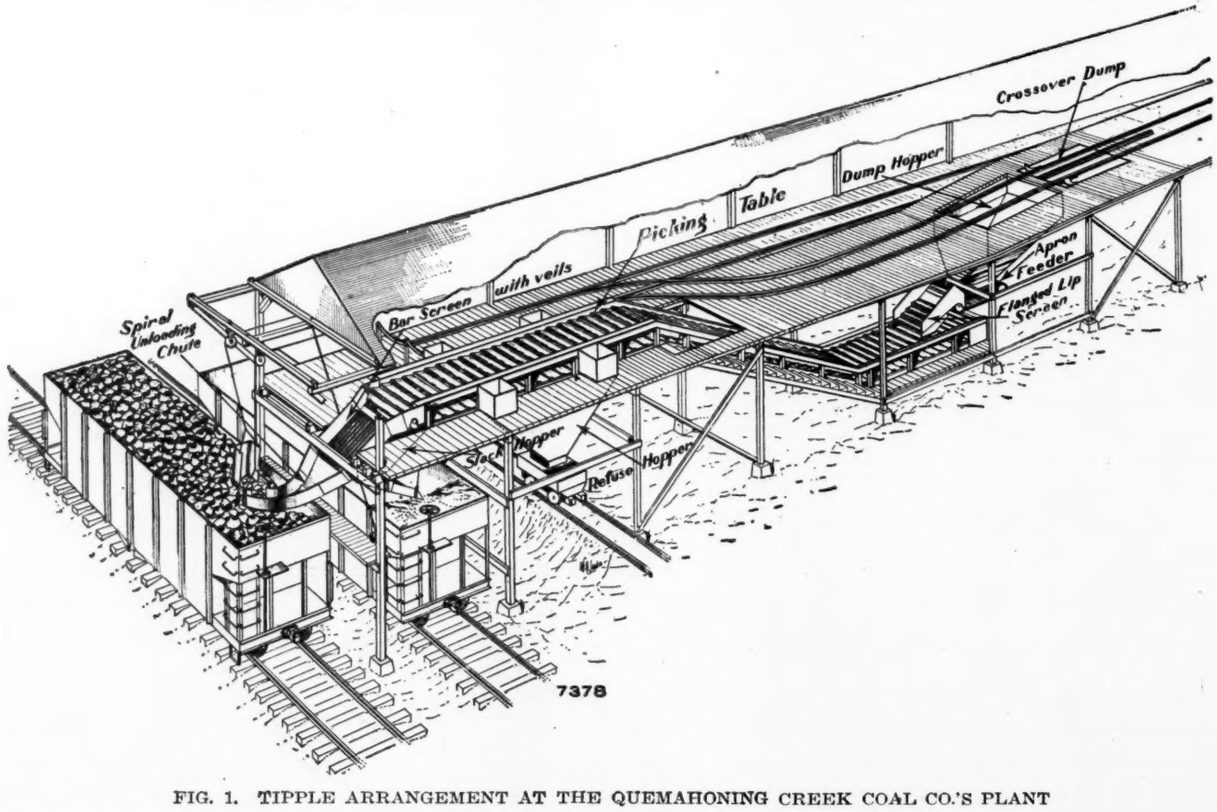


FIG. 1. TIPPLE ARRANGEMENT AT THE QUEMAHONING CREEK COAL CO.'S PLANT

One fact that must not be lost sight of, however, is that the demand for more carefully prepared coal is increasing, so that a preparation which may be satisfactory to the trade today may not meet the requirements a few years from now. It is also possible with a progressive sales force to educate the buyers up to the better value of a coal that is more carefully prepared than that to which they are accustomed and thereby get better prices and new customers.

Some of the essentials of a good tipple are as follows:

1. A satisfactory method of handling and dumping the loaded mine cars and of taking care of the empties so that

*Engineer with the Link-Belt Co.

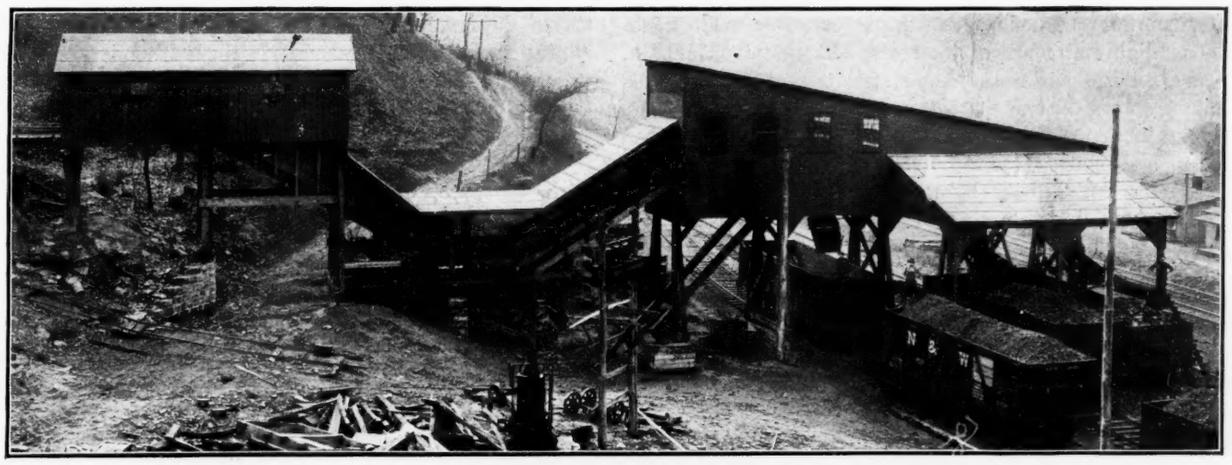


FIG. 2. SURFACE PLANT OF THE LYNN COAL AND COKE CO.

there will be no excess of labor for these operations or restriction in output due to congestion or troubles with the system.

2. A satisfactory transfer of the coal from the dumping point to the tipple, where it is not feasible to dump the cars at the proper point for direct delivery to the preparation system. Sometimes a conveyor from the dumping point to the main preparation system is an advantage as it allows of preliminary picking.

3. A set of picking tables, screens, transfer conveyors and refuse conveyors that will provide for the desired preparation and mixing of the coal and the disposal of refuse.

4. The proper loading devices that will load the various sizes, or combination of sizes, into the railroad cars with the minimum amount of breakage.

5. An arrangement of railroad tracks that will provide for the easy and rapid handling of empty and loaded cars, starting with the dividing up of the train of empty cars and finishing with the making-up of a train of loaded cars.

For handling the cars and dumping them the usual method is a standard crossover dump. The loaded cars are brought to the dumping point in trains and uncoupled just as they go over a knuckle and start down a slight incline to the dump. Each car is caught by two horns, or stops, while the dump is tripped by the operator so that the car is tilted and the coal dumped out of it and, as it rights itself, the stops are held down until the car passes over and runs up to the kick-back, which sends it back and through a switch to another track. It can then be allowed to run on down by gravity or lowered with a chain haul if the dumping point is at a higher level than that at which the trains of empties are made up; or if it is necessary to take them uphill, this can be done with a chain haul.

Transporting, Screening and Picking the Coal

If the coal is to be transferred from the dump hopper to the preparation system, this can usually be accomplished in three ways: An apron conveyor may be used on which the coal is carried along on corrugated overlapping steel slats attached continuously to two strands of roller chain.

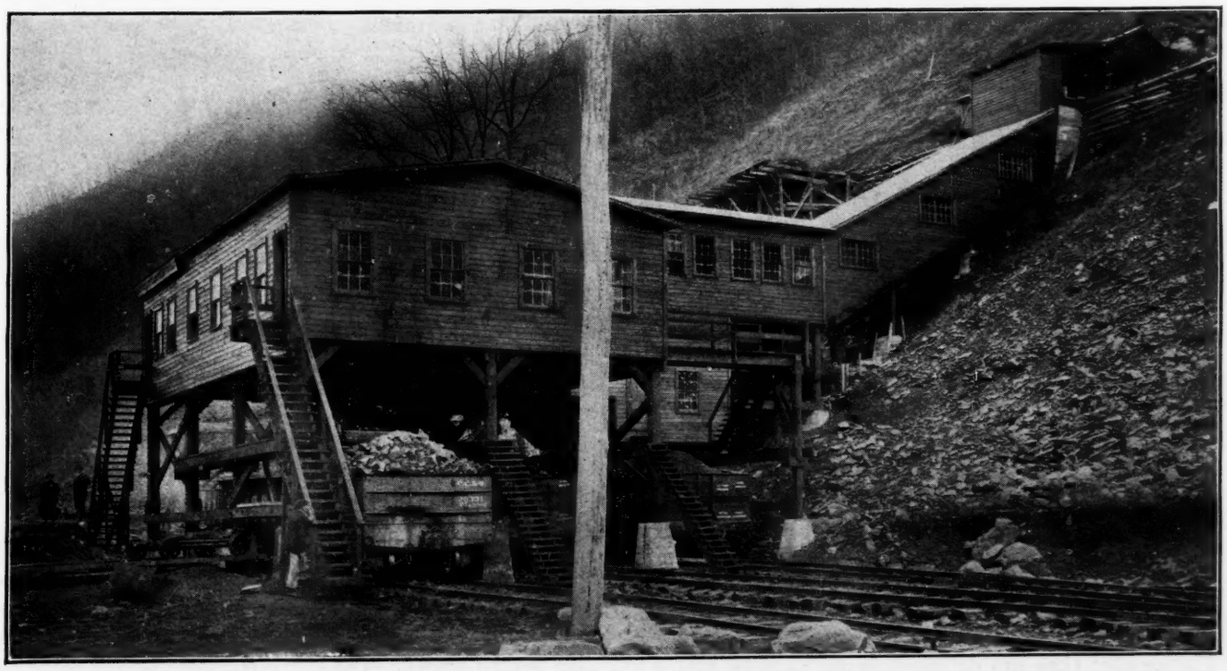


FIG. 3. GENERAL VIEW OF THE MAHER-PURSEGLOVE MINING CO.'S PLANT

Or this may be done with a flight conveyor made up of steel flights attached at intervals between two strands of steel roller chain and acting as pushers to shove the coal along in a steel trough; where it is to be lowered down a steep incline these flights may act as retarders to keep it from sliding down too rapidly. Sometimes the coal is lowered down a hillside by means of monitors which are similar to skip buckets and are raised and lowered with a double cable haul arranged so that the two monitors balance each other.

For screening the coal the most satisfactory device is undoubtedly a shaking screen with the screen part made of the lip-screen type with slotted holes a little wider at the lower end and a slight drop in the screen at the lower end of each row of slots. This arrangement is self-cleaning; that is, it keeps the holes from becoming clogged with coal and refuse and allows the free passage of undersized material.

The most effective picking table is the corrugated apron conveyor on which the coal passes slowly along past the pickers so that the refuse can easily be removed. In order to insure effective picking, it is necessary to first remove the slack and small coal so that it will not cover up and hide the refuse. On this account the material is usually first screened into several sizes and the different sizes carried by separate picking tables, or the two sides of one picking table. In some cases it is screened so that the fine coal is deposited first on the picking table and the larger coal on top where it can be inspected and picked.

The refuse is usually dropped into chutes leading to a flight conveyor or a drag-chain conveyor—that is, a wide chain which slides along in a steel or cast-iron trough and pushes the material along without the use of any flights or other attachments. The refuse can be then delivered to a bin for removal by cars or delivered direct to a car.

After the coal is screened and picked, it is delivered either in the separate sizes to railroad cars on various tracks or certain sizes are combined with others by means of chutes, transfer conveyors or a combination of the two. The smaller sizes are delivered to the cars by means of chutes, but as this method is apt to cause excessive breakage of the larger sizes, loading booms are substituted for chutes when loading these sizes in the best modern tipples. A loading boom is simply a hinged end of an apron conveyor which can be raised and lowered, so that the coal can be deposited in the car with a minimum amount of drop.

The railroad tracks should be arranged so that the train of empties can be easily broken up and delivered to the tracks under the tipple, and there should be room on each track for at least one empty car directly back of the one being loaded, so that it can take its place without delay. The tracks should have sufficient grade so that the cars will drop down quickly by gravity. On the lower side of the tipple the tracks are brought together again so that the cars can be passed over a scale to be weighed and then made up into trains.

Some of the Link-Belt Co.'s latest designs of tipples are described here.

Plants of the Quemahoning Creek and the Lynn Coal Companies

The tipple of the Quemahoning Creek Coal Co., at Harrison, Somerset County, Penn., shown in Fig. 1, is of somewhat novel design, is very simple and is comparatively inexpensive. There are no shaking screens and only one apron conveyor, which also serves as a picking table.

From the dump hopper the coal is delivered by a short apron feeder to a section of lip screen, so that the fine coal is deposited on the apron back of where the lump falls, thus bringing the larger coal on top so that it can be properly picked. The apron conveyor takes the coal up an incline to the proper level and along a horizontal length where the picking is done. It is then delivered over a bar screen, the large coal going over the end of the screen into a chute with a hinged end and thence into railroad cars on one track, while the slack goes through the screen and into cars on another track. The refuse is dropped in a hopper underneath the picking table and taken away by means of mine cars.

By using veil plates to cover up the screen, run-of-mine coal can be loaded. The apron conveyor is 5 ft. wide by 66 ft. long center to center and is driven by a 15-hp. elec-

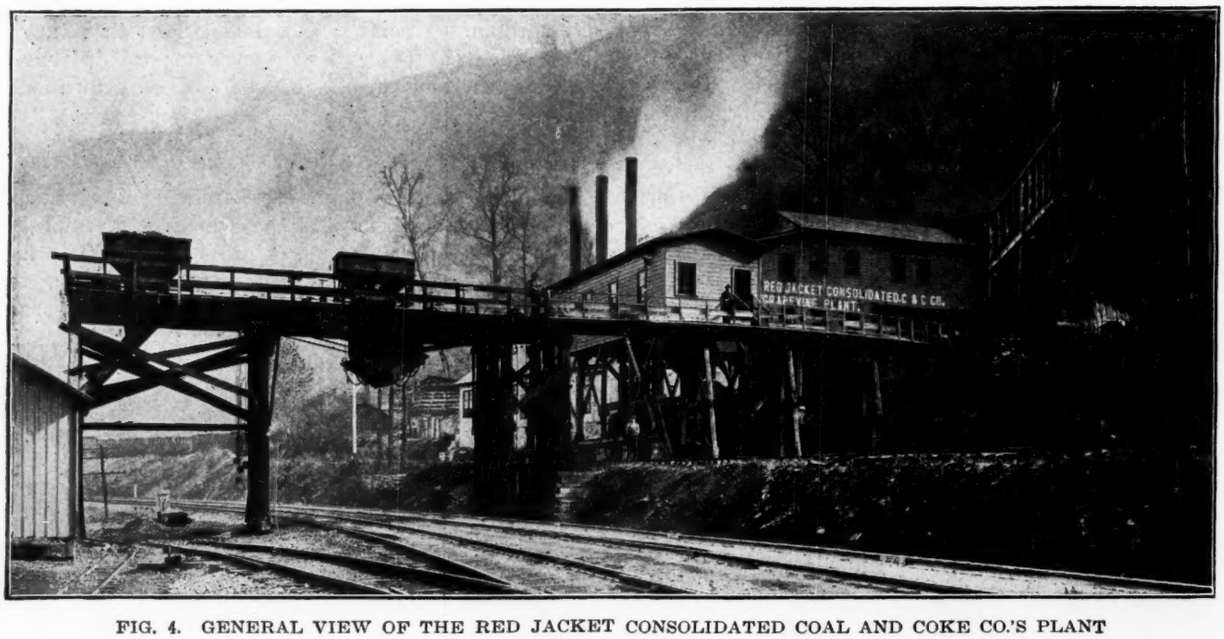


FIG. 4. GENERAL VIEW OF THE RED JACKET CONSOLIDATED COAL AND COKE CO.'S PLANT

tric motor, which also drives the apron feeder. The tipple structure is of wood. The conveyor operates at a speed of 45 ft. per min. and the hourly capacity is 150 tons.

Fig. 2 shows the tipple of the Lynn Coal and Coke Co., at Matewan, W. Va. It is similar to the one just described except that in this case there is no picking and instead of delivering to a fixed bar screen the conveyor delivers to a shaking screen.

The mine cars are lowered to the dumphouse by means of barneys from a point about 1,500 ft. up the hillside. At this point, they are dumped into a hopper with quite a long chute, this hopper and chute acting also as a small storage reservoir. The coal goes from the chute to an apron conveyor, which is 36 in. wide by 48-ft. centers, and which takes it up an incline and delivers it to one of a pair of balanced shaking screens 5 ft. wide. The screens separate the coal into lump, egg and stoker sizes, or it can be shipped as run-of-mine.

There are three railroad tracks underneath the screenhouse, and the cars are loaded by means of chutes with hinged ends. The capacity is 150 tons per hr., the conveyor operating at a speed of 30 ft. per min. and the whole equipment being driven by a 25-hp. motor. The structure is built entirely of wood.

The Maher-Purseglove and the Red Jacket Plants

The tipple of the Maher-Purseglove Mining Co. at Chauncey, W. Va., is shown in Fig. 3. In this case the dump hopper is at a higher level than the screenhouse. The coal is fed from this hopper, by means of an apron feeder, to a short section of lip screen, which delivers to the main apron conveyor and deposits the slack underneath and the lump coal on top. The apron conveyor is 5 ft. wide by 94-ft. centers, the upper part being inclined and the lower part horizontal; it is along this horizontal part that the picking is done.

The coal is delivered over the end of the apron conveyor to the shaking screens, which are of the double suspended balanced type, 6 ft. wide, and here it is screened to lump, egg and stoker sizes, the lump being loaded by means of a loading boom and the other sizes by means of chutes. The coal at this mine is exceptionally clean so that no additional picking, after it leaves the shaking screens, is necessary.

There are three railroad tracks underneath the screenhouse, and it is possible to load the sizes mentioned on the different tracks or almost any combination desired. The refuse is dropped into a hopper and taken away by mine cars. The screens and loading boom are driven by a 20-hp. motor, and the apron conveyor is driven by a 7½-hp. motor. The capacity of this equipment is 200 tons of coal per hour, and the structure is built entirely of wood.

The plant of the Red Jacket Consolidated Coal and Coke Co. at Delorme, near Red Jacket, W. Va., on the Norfolk & Western R.R., is shown in Figs. 4 and 5. At this point the vein is so high up on the hill that it is necessary to lower the coal by means of monitors to the tipple proper, located over the railroad tracks. As the hillside offered a splendid place for the disposal of refuse, it was decided to do the picking at the top.

The impurities are practically all in the larger sizes, so that the design arranges to divide the coal up by feeding it with a reciprocating feeder to a short section of lip screen, which delivers the slack and pea to the center compartment of a three-compartment picking table and the larger sizes to the outside compartments within easy reach of the pickers. After picking, the coal is discharged into one common hopper and fed to the monitors, which lower it down to the tipple proper, where it is screened by means of two balanced shaking screens, only two sizes being made.

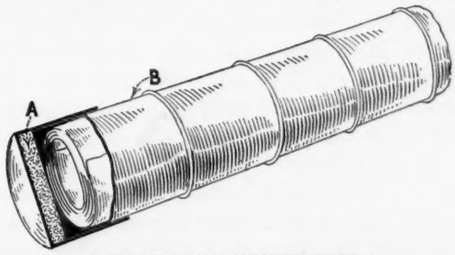
The shaking screens are fed by means of a horizontal apron conveyor 4 ft. wide by 37 ft. 9 in. centers, which receives the coal from the hopper into which it is dumped by the monitors. There is also a chute from the hopper to cars which are run out on a bridge over the railroad tracks and supply the locomotives with coal. The lump is loaded by means of a loading boom and the small coal by means of a chute. A 20-hp. motor drives the screens and the conveyor that feeds them, and also the loading boom, and the picking-table conveyor at the top of the hill is driven by means of a 10-hp. motor. The structure is built entirely of wood, and the capacity of the tipple is 150 tons per hour.

FIG. 5. THREE-WAY PICKING TABLE OF THE RED JACKET CO.

(To be continued)

An Improved Blueprint Tube

If the cover of the cylindrical container for blueprints does not fit tightly, the prints are subject to dampness and the attendant deterioration. The following arrangement to remove this fault was shown recently in the *American Machinist*. A felt wheel *A* about ¾ in. thick was turned down to the right size and then shellacked to the inside of the cover. The tube *B* now hits the felt, making a good joint. No trouble is experienced in keeping blueprints in good condition by the use of this device.



A TIGHT BLUEPRINT TUBE

Extracts From a Superintendent's Diary

Theoretically it should be an easy matter to rid a camp of any undesirable family, but practically it is often difficult. As a rule families are not made up wholly of undesirables, or of desirables either for that matter, and to make an entire family suffer for the shortcomings of some of its members is unpleasant and hard to justify on any grounds. I was forcibly reminded of that fact this afternoon while sitting in front of the office watching the men pass on their way home from the mines.

In the group were five sons of our stable boss, and of the five two (Art and Frank) would now be serving time in a penitentiary if Fate had not come to their rescue—as Fate may on occasions do—and cheated Justice. Of the other three not an unkind word could be said, and it is doubtful if any three men who have more friends could be picked in the camp.

So long as Art and Frank keep out of jail, they are going to spend part of their time, at least, in our camp with their kin, and assuredly they are likely to get into less mischief if at work than if idle. For that reason we have deemed it wise to let them work as long as they will, but even while at work they are forever stirring up trouble.

About a month ago Frank got into an argument with a driver boy about the turn on empties and promptly lost control of his temper, and but for the timely arrival of some miners, the boy would surely have been murdered. Since he was *not* murdered, in fact did not even receive a good-sized bruise, nothing could have been gained by taking the matter into court. On the other hand, since the victim was not especially popular with the miners, being the son of a deputy who was not in favor with the union officials, the union committee promptly let it be known that they would object to an attempt to punish the aggressor. This tied the company's hands, it being too near settlement time to risk a fight with the union, especially one of doubtful outcome.

And so it happens that in our community as in most others, the citizens of peaceable inclinations are in constant danger of being assaulted by ruffians whose presence must be tolerated because of social complications beyond control.

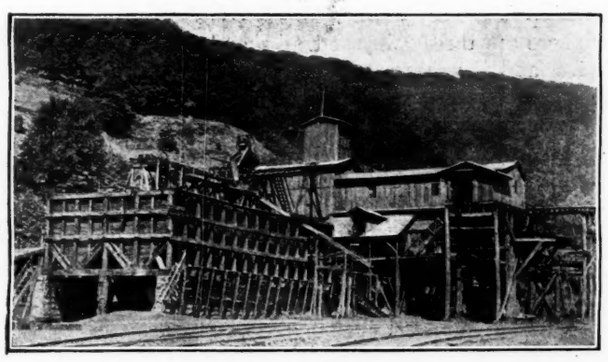
Several years ago we had in our employ a mine foreman who had a son who seemed to hanker after excitement. His ambition was to become a highwayman of the dime-novel variety. When I realized just what we might expect from the son, I promptly notified the father either to get his young man under control or to move out of camp. Failing in the first, the father sought employment elsewhere and the family soon moved to another part of the state. Within a year from their departure the son held up a paymaster at a mining camp, and both were killed in the duel that followed.

In that instance we got rid of our undesirable without much difficulty, and in consequence another camp fell heir to a tragedy that otherwise undoubtedly would have been staged in ours. Looking at it broadly, we simply passed one of our problems on to another camp, an action that would be hard to justify by the golden rule. Perhaps after all it is just as well that we are not always able to follow our inclinations.

Cost of Installing a Second-Hand Washer

The State of Tennessee recently installed at its Brushy Mountain coal mines a New Century differential jig washer. For 20 years coal has been washed by a Robinson washer at this plant and a fairly good furnace coke produced, but the sulphur content was too high for metallurgical purposes. Furnace managers of recent years have become exacting as to their specifications for furnace coke, and to meet their requirements the ash cannot go above a certain percentage and the sulphur must be below 1.35 per cent.

Hoping to make improvements in the quality of the coke and washed coal, the management purchased this jig washer and the necessary coal-handling machinery, as second-hand equipment, from a mine in Alabama. I installed this washer in 1907 to wash Alabama coal for the blacksmith trade. The cost of installing this second-hand equipment in its new location is shown in the following table:



TIPPLE AND WASHERY AT BRUSHY MOUNTAIN

COST OF INSTALLATION

Jigs and elevators	$300.00
Freight	200.00
Labor in dismantling and loading on cars	185.00
One 14-ft. spiral conveyor with sprocket wheels	101.74
Two 4x5-ft. perforated plates	22.00
68 ft. 6 in. of Gandy belt 6 in. in width	24.48
110 ft. of sisal rope	4.08
2 bbl. Creoleum	25.00
2 bbl. coal tar	14.00
68 ft. of Gandy belt 14 in. in width	62.83
One casting for elevator	1.87
Elevator bolts	16.97
24 steel buckets, 12x8x12 in., No. 10 gage	30.00
48 ft. roller bar chain, ⅜x2½x12-in. pitch	72.00
161 ft. Jeffrey 103 chain	48.30
One steel sludge gate	15.00
One 27¾-in. split sprocket wheel	9.28
One centrifugal pump	50.00
30 ft. of 6-in. belt	12.00
Machine bolts	5.00
8 ft. of 2⅞-in. steel shaft	5.52
One compression coupling	8.40
10 squares of paper roofing @ $1.75	17.50
Labor on erection	628.58
5,739 ft. lumber @ $14 per M	80.35
2,327 ft. lumber at $10 per M	18.62
Foundation	
324 bags, or 81 bbl., Royal cement @ $2.85	230.85
73 cu.yd. stone @ $1.20	196.95
41 cu.yd. sand @ $1.35	109.35
Labor	59.20
Design and drawings	30.00
Total	$2,584.87

The Production of Coal in Michigan in 1915 was 1,156,138 short tons, valued at $2,372,797; in 1914 it was 1,283,030 tons, valued at $2,559,786. The average value per ton in 1915, $2.05, was 6c. greater than in 1914 and exceeds any record for the state in recent years. Coal consumption in Michigan is increasing every year, but coal from other states supplies a large part of this market. There were 2,569 men employed in the coal mines of the state in 1915.

The Preparation of Bituminous Coal*

By Andrews Allen†

SYNOPSIS—Coal preparation consists in both cleaning and sizing. Cleaning is done both in the mine and at the tipple. Several varieties of screens are now in use for sizing coal for market, and a proper selection of screening equipment depends upon many variables and can only be made after careful study.

The subject of coal preparation naturally divides itself into two distinct parts: First, cleaning (removing dirt and foreign substances), and second, sizing so as to adapt it to its various uses and to the demands of the market.

Under the first heading should be included the various mining methods adopted in different seams of coal by which it is endeavored to separate the coal from its impurities, the various systems of docking and penalties by which it is attempted to induce the miner to load clean coal, and the mechanical or manual methods of cleaning the material after dumping.

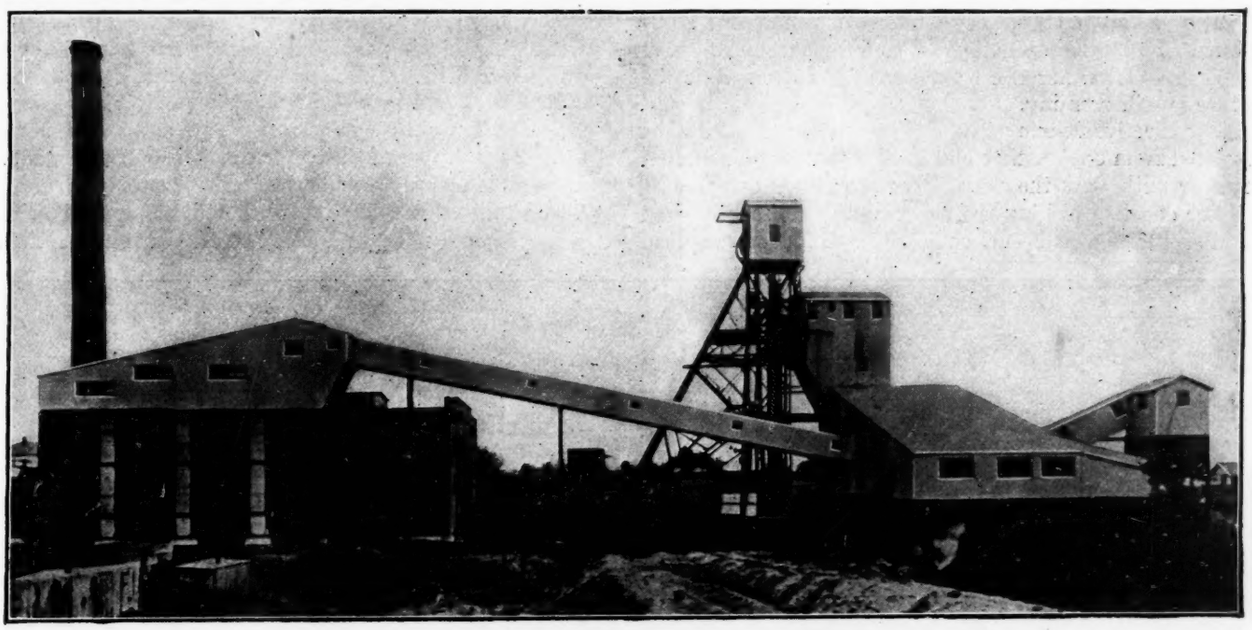
Under the second heading should be included the various methods of screening, crushing to reduce the size of the coal and perhaps briquetting to increase it.

I will attempt to cover each of these subjects briefly and to outline the different methods and processes with which I am familiar.

The choice of mining methods by which it is attempted systematically to mine the pure coal and leave its impurities behind, is manifestly a matter for which no special rules can be laid down. In general it is only a question as to whether a systematic separation in the mine is possible and if so will it pay—whether the loss of good coal will not more than make up for the cost of cleaning.

A docking system may be regarded as a psychological method of cleaning coal. The effective part of it is not the dirty coal removed, but the fear of getting caught. An effective docking system requires in the first place an active and observant dock boss and in the second place some mechanical process by which the product of each pit car can be separately spread out and inspected, the "docks" removed and disposed of without delaying the operation of the plant.

Where small cars are used and weigh pans are employed, as in the Iowa field, it is common practice to use two pans of long flat construction pitched at such a slope that the coal from the dump spreads evenly over them. The pans are filled and dumped alternately, thus giving ample time for effective inspection, picking of the large coal and docking.



MINE AND PREPARATION PLANT AT ORIENT, ILL.

Where large cars are used, say from 2½ to 3 and 4 tons' capacity, it is not practicable to spread the coal evenly by gravity, and in this case, as well as where weigh pans are not used, it is necessary to employ mechanical methods for spreading the coal for inspection.

The advantages of dumping directly into a bin must be sacrificed for effective docking, as it is for this purpose necessary to isolate each dump. It is therefore only possible to use a bin for storage and uniform feed to the screen by placing it beneath the docking table. This arrangement will usually be impracticable on account of excessive breakage and high cost, also because the advantages of a bin are only half realized, it being still impossible to continue dumping without interruption when the docking table is stopped for a dock.

*Paper read before the Kentucky Mining Institute, Kentucky State University, Lexington, Ky., May 12, 1916.

†Chicago, Ill.

The best practical method is to dump into a small hopper with a wide apron feeder which cleans up each dump before the next one comes in. The feeder can be inclined upward so that it will carry only the desired thickness of coal without the use of a spreading bar. It should be of sufficient length and should move slowly enough to allow proper inspection and docking without stopping the table. Where it is necessary to go to greater refinement, the feeder can be made to deliver to a long shaking or conveying picking and docking table so arranged that the coal will here travel much faster than in the feeder. Thus it is possible, for instance, to run the feeder with 18 in. of coal at 30 ft. per minute and the docking table with 6 in. of coal at 90 ft. per minute. This arrangement is employed most effectively at the mine of the American Coal Mining Co. at Bicknell, Indiana.

It is also possible to place a quick-opening gate at the end of the feeder so that a suspicious-looking car can be dumped onto a docking platform or car where the coal can be carefully examined, the dockage removed and the good coal either sent back to the screens or loaded directly into a car.

The operation of the mine can be facilitated at additional cost by the use of two or more feeder and docking tables so that either can be stopped for a dock while the other is still running.

For effective docking it is necessary to have the dumps isolated from one another and to handle the coal as mine-run or with only the very finest screenings removed.

For effective picking the coal must be uniformly sized and should flow as evenly as possible. It must be spread thin enough to expose every piece and must move slowly enough for proper examination.

Picking tables are of two types—shaking and conveying. The shaking picking table has the advantage of turning the coal over so it can be more thoroughly inspected. It is also possible to accomplish a certain amount of screening with the same machine. When used within proper limits, the only disadvantage of the shaking picking table is that it is impossible for the men to work on the table itself, as is the practice in many fields.

Shaking picking tables are of two types—the horizontal (of which the "Marcus" is the best known example), in which the coal is impelled forward by a differential motion either vertical or horizontal, and the inclined type, such as an ordinary shaking pan placed at an angle of from 5 to 10 deg. The latter makes an ideal picking table as the coal travels with little surging and is also turned over to a sufficient extent to allow perfect facilities for inspection. Any type of shaking picking table permits the introduction of a short screen to remove the degradation made in the sizing screen or in breaking up the lump to remove the impurities.

The horizontal picking table may be propelled by a "Marcus" driving head, by eccentric gears or by short pendulum hangers supported ahead of the vertical. The first and the last types are patented and are the most effective; the former operates by a slow forward stroke and a quick return stroke; the latter by decreasing the friction of the coal at the end of the forward stroke by giving the screen a quick vertical drop. These differential motions are hardly perceptible to the eye, but cause more surging of the coal than is convenient for picking large lumps, and therefore I prefer giving the table a slight inclination and using a regular reciprocating motion with pendulum hangers, which will be described later.

Conveying picking tables are either flat beaded-flight conveyors or belts. The former are in most general use. The flights should be single-beaded for better discharge. The chain is usually of the roller type and about 9 in. pitch. Belts are largely used for small sizes of coal where it is possible to run them horizontally or nearly so.

The width of picking tables should not exceed 5 ft. and they should not travel over 100 ft. per minute. This makes it necessary to divide the coal and to use several tables in mines of large capacity. Roughly speaking, a picking table of any type should not be required to handle more than 1,000 to 1,500 tons in eight hours.

COAL FEEDER AND PICKING TABLES IN A MODERN PREPARATION PLANT

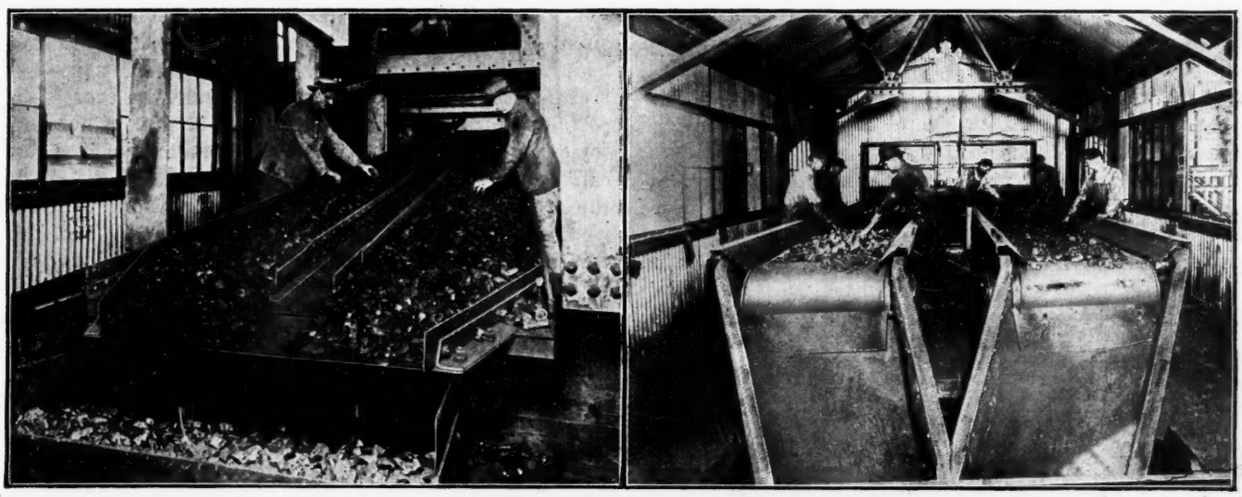
The removal of impurities in lump coal usually requires the breaking up of the lumps with a pick. The broken pieces of good coal must then be returned to the table, in which case considerable fine material is sure to go along or be wasted. The advantage of the shaking table is here apparent, as it presents an effective method for the removal of degradation and undersize. Coal of egg size and smaller is picked without breaking

and can therefore be handled almost as well on a conveying table as on a shaker.

The proper method of disposing of the refuse depends on the kind and quantity of this material and the use to which it is to be put.

For picking lump coal it is desirable to have flat steel-covered tables on which the lump can be broken up, and in many cases it is advantageous to have two compartments in the refuse conveyor so that the burnable g b

Screens for the preparation of coal are of three general types: Gravity screens, either bar or lip type; shaker screens with various shapes of perforations and revolving screens. In addition there are several other types of shaking sizers, mostly patented, depending on the use of different sized corrugations arranged in steps diagonally across the plates. These machines size the coal on a volumetric basis, and the separation is, therefore, not exactly comparable to the ordinary type of



PICKING COAL ON A JIGGING TABLE AND ON BELT CONVEYORS

can be separated from the slate. The pickers should not be required to lift the lumps very high nor to turn around, and the gob chutes should be near enough to all the pickers for convenient handling of large lumps. Actual picking installations are usually a compromise between the ideal arrangement and the operators' pocketbook as a perfect picking and refuse disposal layout is an expensive proposition.

The picking table can be properly combined with a loading boom for lowering the coal into cars of different heights without breakage or for handling to box-car loaders or to crushers. The conveying picking tables may be readily hinged as a whole in which case the pickers work on walks alongside the tables and are raised and lowered with them; or the tables may be hinged at some intermediate point, allowing a horizontal portion for picking, with a movable extension for loading. The shaking picking table is sometimes raised and lowered as a whole, as a loading boom, but this is not good practice, for it is not possible to reach the bottom of a car, unless an excessively long boom is employed, since the coal will slide too fast when the boom is inclined at an angle of more than 15 deg. A beaded loading boom will work satisfactorily at an angle of 25 or even 30 deg. if not loaded too deep. Counterweighted electric hoists are usually employed for raising and lowering the tables.

For the above reasons a shaking picking table should discharge into a conveying loading boom, which, since it is not used for picking, may be light and narrow and should run much faster than a picking boom. The combination, therefore, of the inclined shaking picking table with a light, narrow, fast-running, pivoted loading boom, would seem to be the ideal arrangement for picking. The cost of this arrangement, furthermore, does not exceed that of a less effective outfit.

screen. They have certain advantages over perforated screens, but the limits of this paper will not permit an extended description of them.

The gravity screen is the elementary type—the cheapest and simplest. A rough separation only can be made on a gravity screen, because it is impossible to regulate the speed of the coal passing over it or to turn over and sort the material effectively. For the same reason there is usually much breakage in handling a large tonnage over gravity screens. The coal will flow differently in proportion to its fracture and to its moisture content and quality. The weather and temperature also affect its flow—coal will hang on the screens on a cold morning and run too fast in the afternoon. In one large bar-screen installation recently designed, provision has been made for readily adjusting the pitch of the screens by means of winches. When large coal is to be screened, the bars should be bent down at the lower ends so as to prevent the material catching in the spacer bar at the bottom.

The shaker screen is the most efficient and adaptable machine for screening. The same principle is employed in the housewife's flour sifter and the largest and heaviest multiple-deck shaker screen. The principles of effective screening are as follows:

1. The perforations should be arranged so that each prepared size will pass *through* one set of perforations and *over* another. No coal is properly screened till it has passed over a screen.

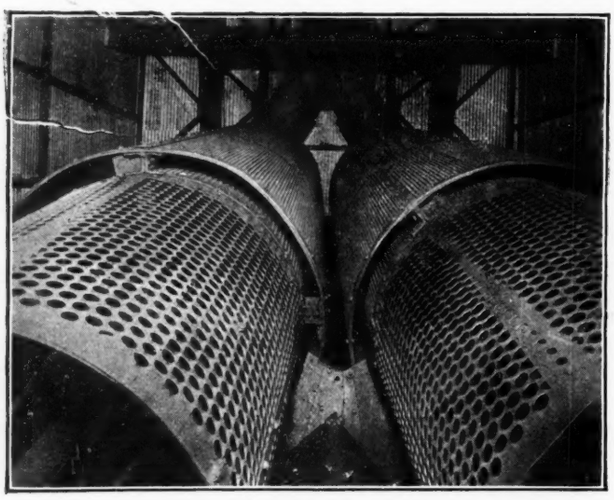
2. The shape of perforations should be chosen with a view to the sizes to be produced and the fracture and other properties of the coal. Round perforations give the most uniform sizing, oval perforations clear themselves somewhat better, and lip screens clear themselves the best of all—in fact, the latter will screen almost anything.

Dry coal having a rectangular fracture is the easiest to screen. Wet coal with a conchoidal fracture is the hardest. A little fire-clay makes the fine coal very hard to screen, and no screening process will separate the fines when the coal is wet, for the small particles stick tenaciously to the larger sizes. Lip screens cause the least breakage and abrasion and should be used where possible for very soft coal. Round and square perforations act like a nutmeg grater in making degradation.

3. The thickness of the plates for producing fine sizes should be chosen partly with reference to the sizes of perforations. Plates having ¼-in. perforations should not be over ⅛ in. thick. When the plates are too thick, the holes will clog.

4. The length of stroke should bear a relation to the size of the largest perforations on the screen. A 6-in. stroke produces good results with 6-in. circular perforations. For smaller perforations a shorter stroke can be employed, while for larger sizes it is better to use oval perforations or lip screens than to increase the stroke.

5. The speed of the shaker should be such as will keep the perforations clear and get the required tonnage over



REVOLVING SCREENS, NOW ALMOST OBSOLETE

the screen. The speed of the coal is a function of the screen speed, length of stroke and inclination, all of which are more or less interdependent variables. The speed should be sufficient to cause the coal to screen both on the forward and backward strokes. It should seldom be less than 100 r.p.m. for easy screening or more than 150 r.p.m. for small sizes of wet coal or difficult screening.

6. The inclination of the screen should, in combination with the speed and length of stroke, allow screening on the forward as well as on the backward stroke and should be such as will produce an average flow of coal at a speed of about 100 ft. per minute.

7. The flow of coal to the screen must be properly regulated. Where small cars are used, it is so easy to handle the dump with a screen of moderate proportions that it hardly pays to consider a feeder. For a moderate-sized car, say 2 or 2½ tons, a self-feeding screen will give good results. By a self-feeding screen is meant one with a blank sheet at the top inclined at a small angle, say 6 to 7 deg., on which the coal is dumped and which spreads the material and causes it to feed onto the screen with moderate regularity. Even for this size of car a feeder is desirable, and for larger cars it is essential. Roughly speaking, the capacity of a screen is practically doubled by uniform feeding. There is little to choose between types of feeder so far as uniform feeding is concerned; both the reciprocating and the apron type give good results, but for other reasons, as enumerated in the discussion of docking, the apron feeder is to be preferred.

8. The thickness of coal on the screen must be limited by "splitting" it where necessary. Thus if it is desired to screen the ¾-in. coal out of mine-run, it is necessary to pass the coal over larger perforations—say 2 or 2½ in. first, then rescreen the undersize over ¾-in. perforations and then mix again. The size of the perforations determines the thickness of the bed of coal that can be effectively screened. Thus a bed of coal 1 ft. thick can be screened over 6-in. perforations, when it would be difficult to screen 3 in. of coal over ½-in. perforations. The relative proportions of the various sizes contained in the run of mine must be carefully studied in designing a screen and its width and the amount of "splitting" determined therefrom.

9. The width of screen must be chosen so as to limit the depth of the coal bed to such a thickness as can be effectively screened over the size of perforations employed. The length of the various perforated plates must be chosen so as to give the coal enough travel to screen out all the undersize without causing a needless amount of degradation. There is no hard and fast rule governing the size of screens, and the proper "splitting" of the coal and arrangement of perforations frequently requires some experimenting.

10. A little vertical as well as horizontal motion of the screen helps to keep the perforations clean. The violent horizontal motion of the "Marcus" accomplishes the same result, but the latter causes more abrasion of the coal. Knockers can also be used where the perforations cannot be kept clean in any other way.

11. All prepared sizes should be rescreened just before delivery to the picking table or loading chute. These degradation screens may be arranged to shake sideways across the flow of the coal or with it in the ordinary manner. In the former case, however, they should be a little steeper than in the latter.

The foregoing in my opinion are the most important principles of screening. How well they are carried out depends on the design and mechanical construction of the plant.

Shaker screens may be carried on hangers, rockers or rollers. Hangers were formerly employed almost universally and were commonly constructed of adjustable rods, the screens being held in line by rollers or rubbing plates. The next improvement was to make the hangers stiff laterally so that the screens could have no side motion, and stiff suspension screens are smooth-running and satisfactory. The hangers need not be attached at the same relative elevations, but must be exactly the same length.

Roller-supported screens are of three types—those here the roller is journaled on the screen and rolls on a track on the structure, where the roller is journaled on the structure and the screen rolls upon it, and where the roller floats between two tracks, one on the structure and one on the screen. The first is the simplest me-

chanically, but is open to the objection that the track clogs up with dirt and causes wear and rough operation. The second is by all odds the best, especially where additional power must be supplied for moving the coal horizontally. In a screen supported by pendulum hangers the flywheel function is performed largely by the screen itself. The forces in the driving arms are thus so largely reduced that the power required to turn the shaft becomes very small indeed and the cause of most screen-operating troubles is therefore removed.

Eccentrics are commonly used for the operation of shaker screens. They have the advantage of simplicity and low first cost, but are defective mechanically. In large screens it is almost impossible to keep eccentrics in adjustment, they are difficult to lubricate and wear unevenly. If loose, they pound badly and damage the connections and the structure, while if tight, they get hot. Where two driving rods are used for each leaf of the screen, it is sometimes necessary to introduce springs in the screen connection. This is absolutely wrong mechanically (there is no more reason for a spring in a screen connection than in the connecting-rod of an engine) and is a frank confession that it is practically impossible to obtain smooth operation with an eccentric.

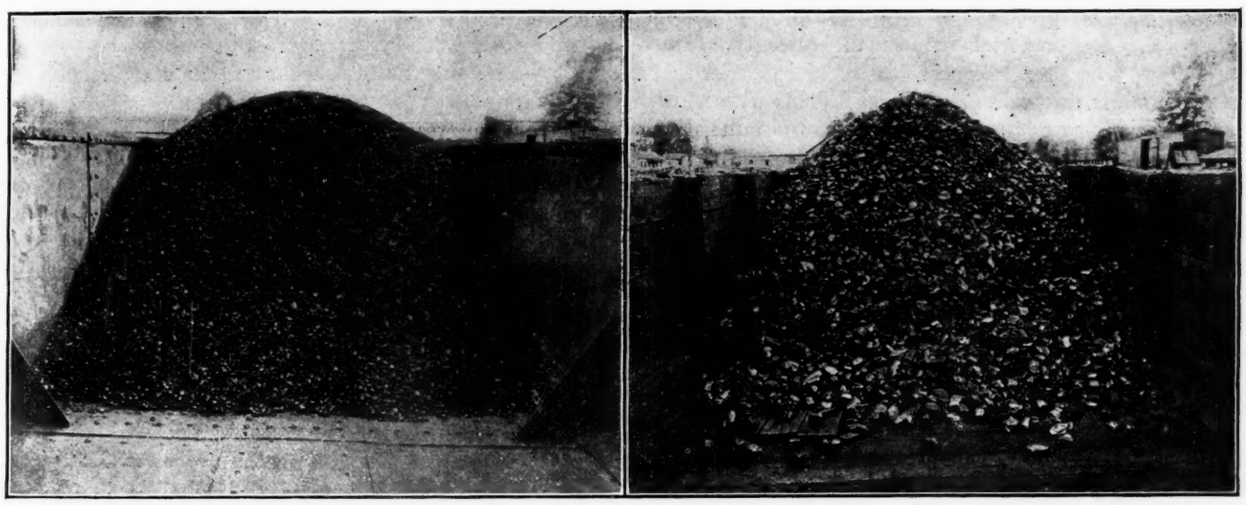
Where the screens are properly held in alignment by flanged rollers, stiff hangers or pendulums, it is far better to drive each leaf of the screen by one driving rod located as near as possible to the central axis. This removes the trouble from lack of adjustment between the two driving rods and reduces the power required to drive the screen. The next improvement is to abandon the eccentric drive altogether and use a shaft which is not continuous or fixed in both rollers.

The third method of screen support is the worst, as the rollers creep, get out of line and wear unevenly. The rollers in any case should be of ample diameter and should have good flanges and wide treads. So built, they hold the screens well in line and when properly constructed are quite satisfactory. However, I prefer the stiff suspension system. Rockers, or struts, similar to the stiff suspenders but reversed, can be employed satisfactorily at times, or screens can be supported at one end and hung at the other, provided there are only two points of support.

The last word in screen support is, however, the pendulum hanger, which is made of a length approximating that of the pendulum having a vibration period equal to the period of the screen. This hanger keeps the screen perfectly in line, gives it a little vertical motion which helps to keep the perforations clear, removes practically all of the longitudinal thrust from the operation of the screen and reduces the horsepower to an almost unbelievable extent.

The ordinary hanging or rolling screen requires careful balancing in order to prevent excessive stresses in the working parts. Single-leaf screens are therefore undesirable and can only be used with "strong-arm" methods which have to be adopted in the construction of the "Marcus." The pendulum hanger, however, makes the single-leaf screen practical and economical. The power for driving a screen should be furnished largely by the flywheel, which stores energy in one part of the stroke and gives it out in the next.

The motor should simply revolve the shaft against the frictional resistance, which in turn is a function of the forces in the driving arms. In any flat screen, however, a center crank of forged or cast steel with driving rods having wedge adjustment should be provided. These crank-operated driving rods give no trouble whatever and reduce the power to scarcely more than one-half that required by eccentrics.



NUT AND EGG COAL READY FOR MARKET

Revolving screens are used to some extent for producing small sizes of coal. As compared with a shaker for the same service, they cause much more degradation and consume more power. They make a slightly better looking coal for the pieces are more rounded and uniform. I doubt much, however, if this improvement in appearance is worth the breakage in preparation.

Revolving screens are nearly always set too flat and are therefore more inefficient than they need be. When set at an angle of from 7½ to 10 deg., they produce fair results, but they take 50 per cent. more power than a shaker of the same capacity and are higher in first cost.

The constantly increasing demand for stoker sizes, combined with the variable demand for domestic fuel, causes great fluctuations in the relative price of screenings and lump, and it is therefore desirable to provide means for crushing all or part of the lump, egg or nut. Where a

market has been established for small sizes of nut and pea, it is desirable to rescreen the crushed coal so as to recover such sizes as command the best prices.

The railroads are also demanding lump coal, not to exceed 8 to 10 in. maximum size and the oversize when screened out is often difficult to dispose of. It is therefore desirable to crush the lump for the railroad trade, and many crushers are installed every year for this purpose.

Crushers are of two general types—single and double roll. The first causes a little more degradation, takes slightly more power, but allows unlimited adjustment, so that any size of coal can be produced. This type is therefore to be preferred for general use at a mine.

The double-roll crusher can be used when any one size of product is required. Any crusher, either single- or double-roll type, should have the coal fed to it as uniformly as possible. The best arrangement is to locate it at the end of a cross-conveyor, so that any size—lump, egg or nut—may be crushed according to market conditions. The product may then be loaded direct as stoker or railroad coal or rescreened as desired. The undersize should always be screened out before crushing mine-run coal, as the fine material reduces the capacity of the crusher.

In general, the experience of the coal fields with which I am familiar proves that preparation at the mine pays. The mine that can produce coal in usable form at all times, according to the users' needs, will run while its neighbors are shut down and can build up a market for its product that will much more than pay interest on the investment and the added cost of preparation. One of the large operators in Illinois increased the average selling price of his screenings by 14c. per ton by building a rescreener at a cost of about $40,000. The rescreener is handling about 1,500 tons and earning about $200 per day, or $40,000 in 200 working days. Similar results are possible elsewhere, but it must be remembered that preparation must be planned with reference to the particular properties and uses of each grade of coal and that the plant that proves a winner in Illinois may not produce the same returns in Kentucky.

Shooting Soot from Stacks

When power-plant stacks accumulate enough soot to hinder the draft, they should be cleaned, but this is a disagreeable and unhandy job. A method of "shooting the stack" with powder is described in the *Du Pont Magazine,* by using a stack gun made as follows:

Bore a hole 1¾-in. diameter and 10 in. long in the center of a piece of 4-in. shafting 14 in. long. Then bore a horizontal hole ¼ in. diameter through the piece to the bottom of the center bore. The whole thing can be mounted on a pedestal about 6 in. in diameter so that it will stand in an upright position.

The method of operation is as follows: Pour some FFF blasting powder into the mouth of the cannon to about 2 in. from the top. Tamp to the collar with dry clay. A short piece of fuse is inserted in the touch-hole and in contact with the main powder charge. Open the flue door at the bottom of the stack, set the cannon on the bottom and in the center of the stack, light the fuse and close the flue door.

The explosion shakes and loosens the soot adhering to the sides, causing it to fall to the bottom. It can then be removed through the flue opening.

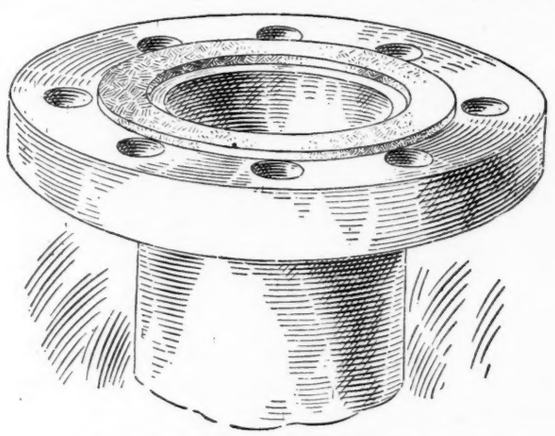
A charge of 8 in. of FFF powder, 1¾-in. diameter, is sufficient for a stack up to 100 ft. high and 4 ft. diameter or over. The number of shots necessary to thoroughly clean a stack depends upon its condition. Ordinarily three or four shots will clean a stack, but if very dirty it may require more. The size of the charge and length of the cannon can be regulated to suit the height and diameter of the stack.

There is no doubt about the efficiency of this "gun" for cleaning smoke-stacks. One of the largest manufacturing concerns in the country has used this method for several years, without an accident or injury to the stacks.

Renewing Blown-Out Gaskets*

One of the disagreeable jobs in the power plant is that of replacing blown-out gaskets, but much trouble may be avoided by knowing just how to go at the job. A gasket properly installed will hold much longer than one applied indifferently; in fact, there are places where, only by exercising the greatest care, can they be put in to stay.

One of the worst and most common errors is that of cutting the gasket the full size of the flange and making holes for the bolts. This not only consumes time, but requires three times as much sheet rubber,



PACKING CUT TO GO INSIDE BOLT CIRCLE

and when completed, it is decidedly inferior to a gasket cut to fit just inside the bolt circle. That part outside the bolt circle will in no way prevent a leak. Any unnecessary packing placed between the flanges only prevents the useful part of the gasket from being properly compressed.

Another error, too commonly found, is that of oiling the gasket before putting it in place. Oil is rubber's worst enemy, and even without lubrication the gasket will blow out soon enough.

If the gasket is cut to fit inside the bolt circle it will be much easier to get in place, as the bolts on one side only need to be removed if the faces of the flanges are clean and the remaining ones loosened up about a quarter-inch, when the gasket can be slipped into place guided by the remaining bolts.

*J. M. Row in "Power."

Practical Considerations Relative to Purchased Power

By H. P. Musser and F. B. Lamb*

SYNOPSIS—The advisability of purchased power is an ever-present problem. Its adoption in any particular case will depend on the power consumption per ton of coal produced. In each instance there will be a critical, or neutral, point where central-station and isolated-plant service are exactly equal in cost. With a lesser power consumption per ton the central-station power will be cheaper, and with a greater consumption power from the isolated plant will be cheaper.

Probably no subject has been discussed more by mine operators in the last few years than that of purchased power for mines, and many articles have been written both pro and con on this subject. The object of this paper, however, is to discuss a few questions that are usually asked by coal operators.

Cost is usually and naturally the first consideration, and in order to discuss this feature some general remarks will first be made on contracts.

Relative to rates, power agreements are generally divided into primary (or "maximum demand"), secondary

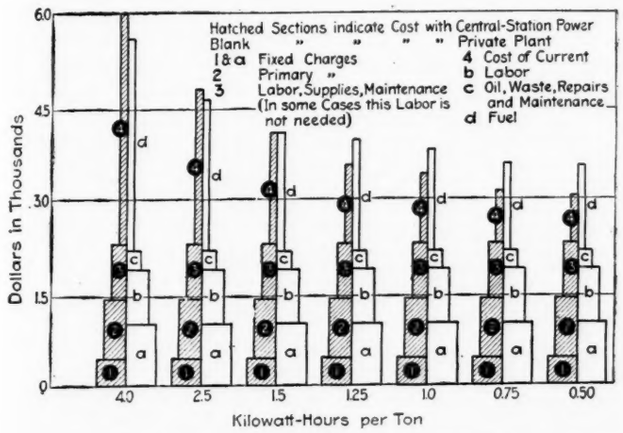


FIG. 1. RELATIVE COST OF POWER

(or "current") and minimum charges. The first is generally based on a fixed charge per rated horsepower connected in alternating-current apparatus or on the highest peak load observed during the month for any definite period, as three, five, ten, etc., minutes. The secondary charge, which is added to the primary, is based on a sliding-scale rate, and the minimum charge is usually made on the horsepower connected in alternating-current apparatus.

Some companies give an option relative to the two methods of basing the primary charge, while others stipulate only one method in the agreement. The proper selection in the former case is important and is dependent principally on the grades in the mine and on the haulage road, fan and pumping loads, amount and nature of equipment and cycles of operation.

*Charleston, W. Va.

Both the primary and secondary charges vary considerably with different power companies, and in some cases one company's rates may be higher than another firm's under one condition and lower under another.

The operator, in taking up the cost consideration, usually obtains data from other operators using purchased power, and these data prove to be not only inconsistent but confusing. An analysis of the varying factors entering into this phase of the problem, together with a study of the items included in power-house cost and rates, will throw some light on this subject.

The cost items relative to the mine itself are based on many variables, such as the following: Ventilation, pumping and stationary motor loads, grades, bonding, trolley and feeder systems, condition of power plant, equipment in mines, lighting of camps, water conditions, and even the personal element of the power-house men.

As an indication of the irregularity in power consumption naturally resulting, the following table of the power used per ton of coal mined as obtained from over 50

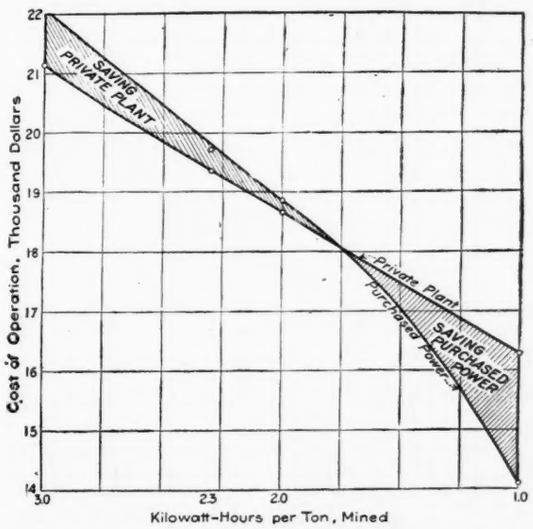


FIG. 2. CURVES SHOWING POWER COST

actual tests arranged according to tonnage classes is shown:

POWER CONSUMPTION PER TON OF PRODUCTION

Yearly Tonnage	Kilowatt-Hours per Ton — Maximum	Average	Minimum
300,000 and over	6.9	3.4	1.03
150,000 to 300,000	15.4	2.8	1.17
100,000 to 150,000	10.4	3.1	0.99
50,000 to 100,000	3.6	1.3	0.69
50,000 and under	4.1	2.3	0.45

An analysis of the items entering into the cost of a private plant, together with the rates of the central station, will show that for any particular case there is a certain kilowatt-hour consumption at which the cost in either case will be the same. Below this point purchased power will be cheaper and above it higher. This fact is illustrated graphically in Figs. 1 and 2, which are based on actual tests made on two plants. The former was a small installation, while the latter was a large one with a load entirely different in nature.

It is self-evident that the foregoing relation is true, for as long as the capacity of the plant remains the same, the only item changing appreciably with the increased kilowatt-hour demand is the coal consumption. Hence the cost per kilowatt-hour rapidly decreases with increased load. On the other hand, the central-station rates per kilowatt-hour decrease with the power consumption, but this does not usually decrease in the same proportion.

Special attention is called to the fact that these curves are true for the two particular cases only, and while the curves for any individual plant will always intersect somewhere, the position of the point of intersection will vary widely, according to conditions.

Important Considerations in Negotiating a Power Contract

After due consideration is given the various items already mentioned relative to the cost of an isolated plant, the important features to be considered in the power contract are as follows: The condition of the central station relative to construction of power station, the nature of the transmission lines and service record, nature of contract as regards rates, legal and engineering features.

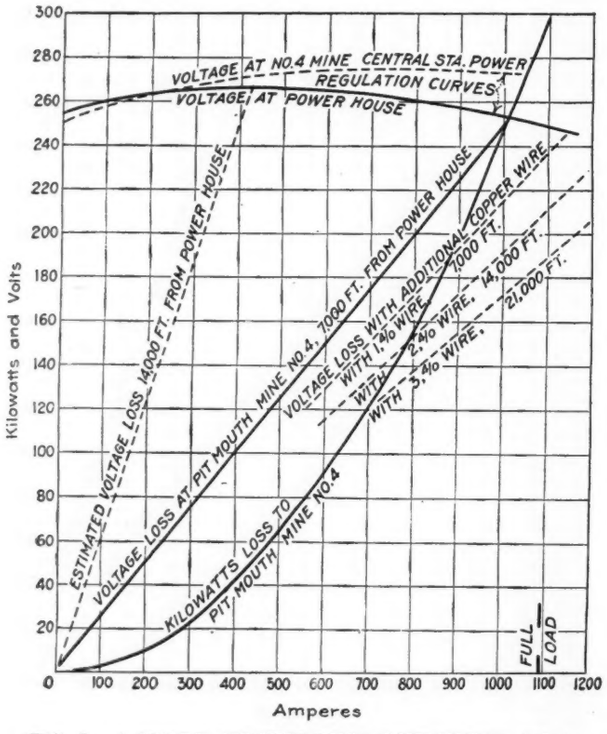


FIG. 3. A SHORT-CIRCUIT TEST CONDUCTED ON A MINE PLANT

The final goal to be obtained is assured, continuous, good voltage conditions and continuity of service, combined with reasonable cost of power.

Probably no more important factor enters into the production of coal than good power; it is the heart of the coal mine. With the usual direct-current plants there is an economical zone within which power can be transmitted. There is also an economic limit to the installation of copper. The fact that one operator is transmitting, say, 250 volts farther than his neighbor with better results may or may not be due to a better condition of the electrical system as a whole. It may be entirely dependent upon load conditions.

This is illustrated graphically in Fig. 3, which shows a "short-circuit" test conducted on a plant. The trolley, feeders and rails were shorted 7,000 ft. from the power house. The principal items we wish to show here are that the loss in power increases rapidly with the load. This company had reached the economical limit of the installation of copper. It will be observed that at 500 amp. the loss of power was 62 kw., while at 1,000 amp. this loss was 248 kw., or four times as great. This curve also shows bad regulation of the generating outfit, the results to be obtained in installing additional wire (illustrating the economical limit of copper) and the slight increase in voltage to be expected from adding copper. Apparently the only solution here was either purchased power or an alternating-current plant, together with a substation near the workings.

Too much stress cannot be laid on the importance of proper installation, maintenance and operation of the underground electrical system. The writers have inspected numerous mines in which many inefficiencies have existed for years at a great loss to the coal company not only directly in relation to the power, but worse yet, indirectly in greatly reducing the output. The increasing tendency toward making regular electrical inspections of coal mines is certainly along the right lines.

Efficiency as regards the operation of any plant is important, but it is especially so when purchased power is used, or rather, if power is purchased the management is furnished monthly with a statement of power expense, any changes or economies that may be effected are here brought into prominence by being shown in actual dollars and cents.

As a rule ventilation costs more with central-station power than any other load, and perhaps less attention is paid to it. In this item the greatest economies can usually be obtained. The writers recently conducted tests on three fans operated by one company using purchased power. Two of these machines were of an old construction and the third a new turbine make. The efficiencies of the first two show 13 and 25 per cent. respectively. The new fan was delivering 30 per cent. more air than the first, with 14 per cent. higher water gage, and was consuming only 40 per cent. of the power. Fan loads being steady and continuous, the opportunity here presented for economizing in power bills is pronounced, not only through the proper selection of equipment to fulfill the required conditions, but by paying particular attention to the aircourse to secure the proper ventilation with the least frictional resistance.

The mine pumps at this same place were also operated inefficiently. Although the bonding, trolley and feeder systems were in excellent condition, the voltage was abnormally low and there were enormous losses because of the improper location of motor-generator sets. Hence the pumps have been working with a handicap for years for want of the proper attention to engineering considerations.

The foregoing is an example of the waste of power that will be found to exist to a greater or less degree at a large percentage of collieries. Often inefficiencies can be remedied with little or practically no expense, as for example, a suggested change to one company costing $5 resulted in a continuous saving per month of about $40. In no field is efficiency engineering more needed than around coal mines, and usually less attention is paid to it here than elsewhere.

Costs of Operating Electric Cap Lamps

Almost exactly one hundred years ago, Sir Humphry Davy, in a communication to the Royal Society, London, enunciated the principles of his safety lamp, which to this day underlie the construction of all flame safety lamps. The later history of mine lighting is one long series of experiments in improving the Davy lamp—no other practical principle of safety-lamp construction had been produced until the perfection of the portable storage-battery electric cap lamp for miners' use.

Much ingenuity has been shown in trying to adapt portable electric lamps to mining work, but the stumbling block has always been the production of current for their operation. The primary cell was early eliminated from serious consideration and experiments were made with storage batteries. Within a comparatively recent time a practical form of alkaline storage battery—that is, one using no acid—has been invented and used with considerable success in the coal mines of this country. It permits an unbreakable container made of steel. The nature of the material and the all-steel construction make it possible to keep such a vessel liquid-tight in severe mine service and eliminate the previous danger of damage to person and clothing by leaking acid, as well as a loss of light by the diminished capacity.

The characteristics of safety mine lamps operated by storage batteries are so different from the types used previously, that the following details of installation and maintenance will be appreciated by those engaged in the buying and operation of mine equipment.

At the Keystone Coal and Coke Co.'s Salem mine, New Alexandria, Penn., 200 Edison electric safety mine lamps are in service. One hundred of these were installed Sept. 17, 1915, 50 were added Nov. 18 of the same year and another 50 on Jan. 6, 1916. Besides this a large number of additional lamps are on order for this mine. The success in operation of this lamp equipment has been so pronounced that this company has ordered 1,600 to replace 1,100 of the lead-acid type previously used.

Including the erection of charging racks, switchboards, etc., the cost of installing these 200 lamps was approximately $2,000. From Sept. 17, 1915, when the first lot was installed, until June 1, 1916, the only expense for maintenance and upkeep, all necessary supplies and repair parts, such as cords, bulbs and lenses, has been $383.87, which is only a trifle over 24c. per lamp per month.

During the period from Sept. 17, 1915, to June 1, 1916, there was a total of 34,250 lamp shifts, so that the actual cost per lamp per shift for maintenance and upkeep during that time was 1⅛c. The total cost for service, including salary of lamp tender, current, interest on investment, and depreciation, has been 2¾c. per lamp shift.

As these lamps have all been in continuous service for a period of 6 mo., and some for more than 8 mo., these figures are most interesting, in view of the fact that they represent the maximum cost at any time during the operation of this type of lamp, since from its very construction, there can be no further depreciation or necessary repairs except those included in the amount given.

No damage is done the Edison cell when overcharged for a short or long period, and it is not injured by lying idle in a charged, semicharged or discharged condition indefinitely. These points are mentioned simply to explain the extremely low cost of maintenance and to show why it is possible for such a cost to include everything that may ever happen to the batteries, no matter what the service they may have to undergo.

At the Merchants Coal Co., Orenda No. 2 mine, Boswell, Penn., 250 Edison lamps were installed on Feb. 15, 1916, at a total cost of approximately $3,200. These lamps have been in continuous service since that time, and up to June 1 there was a total of 30,450 lamp shifts. During this time the total cost for bulbs, cords, lenses and all other repair parts was $126.49, or a trifle less than 15c. per lamp per month. On the basis of 30,450 lamp shifts, the cost per lamp shift was 0.4c. Add to this the cost of lamp tender, current, approximate depreciation and interest on original investment, and the total is 2c. per lamp per shift.

These two installations show the approximate range of cost, fixed charges, depreciation, interest on original investment, service and current being the same in both cases. One installation had been in service for 8 mo., and the other for 3½ mo. at the time these figures were obtained.

The figures given herewith were taken from the invoices covering material shipped to these mines during the periods mentioned, and no account has been taken of the material on hand on June 1, 1916, in either case; so that there is a satisfactory margin, and the costs shown are slightly in excess of the actual replacements during the period outlined. No expense has been incurred for repairs or replacements of the batteries themselves at these installations, which are similar to over 100 others put in service during the past 15 mo., ranging in size from 25 to 10,000 lamps.

Coal Situation in France

Some interesting points on the fuel question in France are brought out in a recent *Consular Report* under date of June 20, from which the following excerpts are taken:

St. Etienne—The figures furnished by the Mining Bureau of the Loire Department show that the coal production in the Loire Basin during 1915 decreased 13,118 tons compared with the corresponding figures for 1914. The following figures show the total output of the principal coal-mining companies in this region for the last three years: 1913, 3,398,357 tons; 1914, 3,044,857 tons; 1915, 3,031,739 tons. Owing to the great activity in the iron and steel mills, market conditions in bituminous coal were very favorable and high prices were maintained. Considerable difficulties arose through inadequate transportation service. The problem of labor in the mines also caused more or less anxiety, by reason of the younger element among the miners being mobilized in the armies.

La Rochelle—The coal trade, which is by far the most important item of the foreign commerce of this port, has suffered seriously from lack of colliers and the consequent rise in freight rates. Insurance has also increased on cargoes coming from Great Britain. The coal employed locally is the large Cardiff for general use, and the small Cardiff for the manufacture of boulets and briquettes. The large Cardiff is normally quoted to La Rochelle importers at prices varying from $2.67 to $3.65 per ton, and the small at about $1.52 per ton. By the end of 1915 the large Cardiff was being quoted at $8.26, while the small had not varied appreciably. Freight rates have risen from $1.46 to $1.70 a ton from Cardiff to $10.22 a ton.

Nice—At present Nice is paying high prices for coal. Ordinary English coal, unwharved, is wholesaled at $27 per ton, and $29 per ton for anthracite.

Coupling-Pin Fasteners

By Ralph W. Mayer*

I have successfully employed certain arrangements for fastening the coupling pins on mine cars and believe that a description of the devices used would be interesting to *Coal Age* readers.

The cars on which this device is employed are coupled together with a single flat link about 12 in. long made from a steel bar 1-in. square. The drawbars of the cars are made from two pieces of iron or steel riveted together. The bottom piece is a plate of ¼-in. iron or steel about 8 in. wide, a bar of iron or steel 4 in. wide and ½ in. thick is riveted lengthwise to the middle of the steel plate on its upper side.

Both plate and bar are of the same length when fixed in place and extend about a foot beyond the end of the car bed or box. Where the upper bar of steel passes through the end of the car box, it is given an offset upward of about 2 in., leaving a space of about 2 in. between the plate and the bar for the coupling link, which is 1 in. thick. A coupling pin enters the hole in the end of the upper bar, passes through the coupling link and through a hole in the lower plate.

The bottom of the car is made of 4-in. planks which extend about a foot beyond the end of the car box and act as bumpers. The ends of the bumpers are shod with

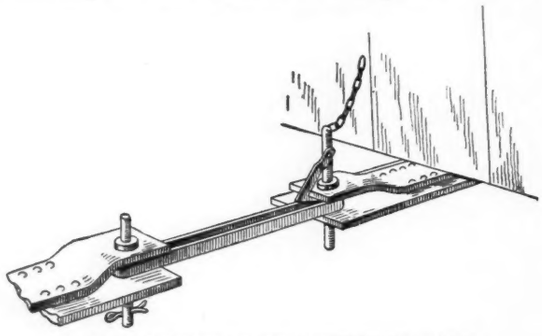


FIG. 1. DEVICE USED BETWEEN CARS

plates of ¼-in. iron which pass around the top, end and bottom of the bumpers and are held in place by bolts passing through the plates and ends of the plank bumpers.

The drawbars are about 2 in. shorter on each end than the bumpers and are bolted fast to the 4-in. planks that form the car bottom. They are also bolted to the car axle. The coupling pins are fastened to the cars by light chains so they will not get lost.

An angle, or claw-shaped piece, made from 1x¼-in. iron bar is riveted to the coupling pin near its top end in such a manner that it will swing freely up and down. The coupling pin extends about 6 in. above the top of the drawbar. A collar welded to the pin prevents it passing any farther through the drawbar.

The claw-shaped piece that is fastened to the coupling pin should be of such a length that when the pin is in position in the drawbar, the claw will extend over the end of the upper bar of the car drawbar, but not to the lower plate of the drawbar. It should be placed inside the link.

If the coupling pin attempts to rise, the claw will engage the top bar of the drawbar and prevent the pin from jumping out of its position. When it is desired to uncouple the cars, it is only necessary to catch hold of the claw, raise it from between the bar and plate and pull out the coupling pin.

The claw is fastened to the side of the coupling pin, but it should be given an offset near its middle so that the claw proper will line up with the center line of the coupling pin, giving it relatively the same position as if it was fastened to the center of the pin.

The other end of the coupling link is permanently fastened to the drawbar by means of a coupling pin having a cotter passing through its lower end, this preventing the pin from jumping out of place.

Fig. 1 illustrates the idea. This safety catch has been in use for years at the Mine No. 3 of the Northwestern Improvement Co. with never a mishap.

A safety catch on the haulage-rope coupling pin has also been employed. The haulage rope is fastened, by means of a babbitted socket, to a short length of chain, 4 to 6 ft. long. The chain is provided with a swivel, and on its end a clevis, which is fastened by means of a pin to the foremost drawbar of the trip. This drawbar, of

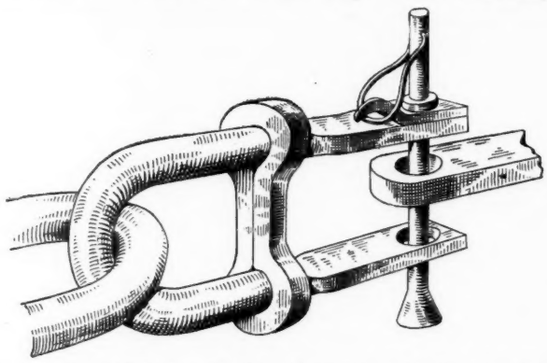


FIG. 2. PIN HOLDERS USED AT END OF HAULAGE ROPE

course, has a hole in the end through which the pin passes.

The sides, or bars, of the U-shaped clevis are held a uniform distance apart by shrinking a hot link entirely around both near their middle and hammering it closed between the bars. This forms a solid connection between the two sides.

The lower end of the coupling pin, which passes through the end of the clevis, is made in the shape of a truncated cone, and of a larger diameter than the rest of the pin. The hole in the lower bar, or side of the clevis, is made large enough to permit this enlarged end of the coupling pin to pass freely. The hole in the upper bar of the clevis is made smaller and cone-shaped, so that when the coupling pin is withdrawn its lower end fits this hole in the upper bar snugly but will not pass through it.

The lower end of the coupling pin should then be flush with the lower side of the upper bar of the clevis, allowing the cars to be uncoupled readily, but preventing the clevis and pin from becoming separated.

The coupling pin extends about 6 in. above the top of the clevis. A ring passes through a hole in the top end of this pin. This ring is bent at right angles to the pin on both sides, so that it cannot slide through the hole in the pin but only swing up and down. The upper portion of the ring is enlarged into a circle large enough to reach to the upper bar of the clevis, where the bar, or link, connecting the two sides of the clevis is fastened,

*Roslyn, Wash.

just barely clearing this bar and resting on the clevis when the coupling pin is in position.

A bar or plate of steel is welded to the top bar of the clevis having a claw-shaped projection on its end. Sufficient space is left between this claw projection and the top of the clevis to accommodate the ring. Only enough space is left between the end of this claw and the bar, or link joining the two sides of the clevis, for the ring to pass freely.

When the coupling pin is in position, this ring should lie on top of the clevis under the claw projection and back of the bar clevis connection. When tension is put on the haulage rope, the clevis moves forward a trifle, there being some lost motion between it and the coupling pin. This motion pulls the ring still tighter under the claw projection and entirely prevents the coupling pin from rising out of place.

For best results the claw piece should be made from spring steel. Fig. 2. illustrates the idea. Mine No. 6 of the Northwestern Improvement Co. has made use of this safety catch.

How To Keep Cement Fresh

It is sometimes thought that only one thing is necessary for the safe and effective storage of cement—a tight roof. Many years' experience has convinced S. P. Baird that water-tight storage is not enough, and he has given, in *Engineering News,* the following requisites for cement storage:

1. Cement will retain its strength for an indefinite period when stored in air-tight containers.

2. Cement will be injured less by storing in paper sacks than in cloth sacks, everything else being equal.

3. Cement in any kind of commercial packages will be injured least while in storage if the packages are piled as closely together as possible. In other words, the outside surface of the pile of sacks should be reduced as much as can be arranged.

4. Piles of cement sacks should be covered with a tarpaulin to prevent as far as possible the circulation of air through the pile.

Note the word "tarpaulin"; an ordinary canvas cover is not a tarpaulin, but a paulin. Five parts coal tar, one part gasoline and one part good japan drier make a water-tight black coating for canvas such as is needed for this kind of work.

Surface condensation often takes place on a stored sack of cement. The moisture is carried into the cement to its great injury as well as the practical destruction of the sack. The deterioration of the sack may not be evidenced at once; but it may be returned to the mill and refilled and sent to some other job, where it bursts and is paid for by a person who was in no way responsible for its condition.

There is a saying among cement men that if you turn your cement—that is, move it from one pile to another—once a month, it will not be injured by an indefinite period of storage. This is not the case; pile it closely and cover it as nearly air-tight as possible and you will have very little caked cement. If the cement is caked it is better to let it alone until you are ready to use it rather than to break the cake, thus presenting fresh cement to the action of the air.

The Miner's Prayer

By Berton Braley

Written expressly for Coal Age

Lord, I am one of those who toil
Far from the warm light of the sun;
In depths beneath the pregnant soil
My hard and thankless task is done.
Yet, though I am a humble soul,
I pray thee, Lord, to keep me fit
For this my job of mining coal
That men may have the use of it.

Keep me from drink and things that lead
To shaky nerves and visage blear;
Lord, let me serve the great world's need
With steady hand and eye that's clear.
In shaft and room and gallery
Let care and caution be my rule;
Teach me in all my work to be
Patient, efficient, watchful, cool.

I serve—in workings dark and deep,
Delving in earth like any gnome;
My wage should be enough to keep
A free man's greatest joy—a Home.
So make me fair to those who pay
The wage for which I labor so,
But save me, Lord, I humbly pray,
From those who crush their workers low.

From gas and damp, from deadly dust,
From shaky roof and hanging shelf,
Thou wilt protect me, Lord, I trust,
Yet will I watch these things myself.
Help me to bear the fret and irk
That each day brings to me again,
And keep me worthy of my work
And proud of this, my job. Amen.

A New Portable Coke Loader

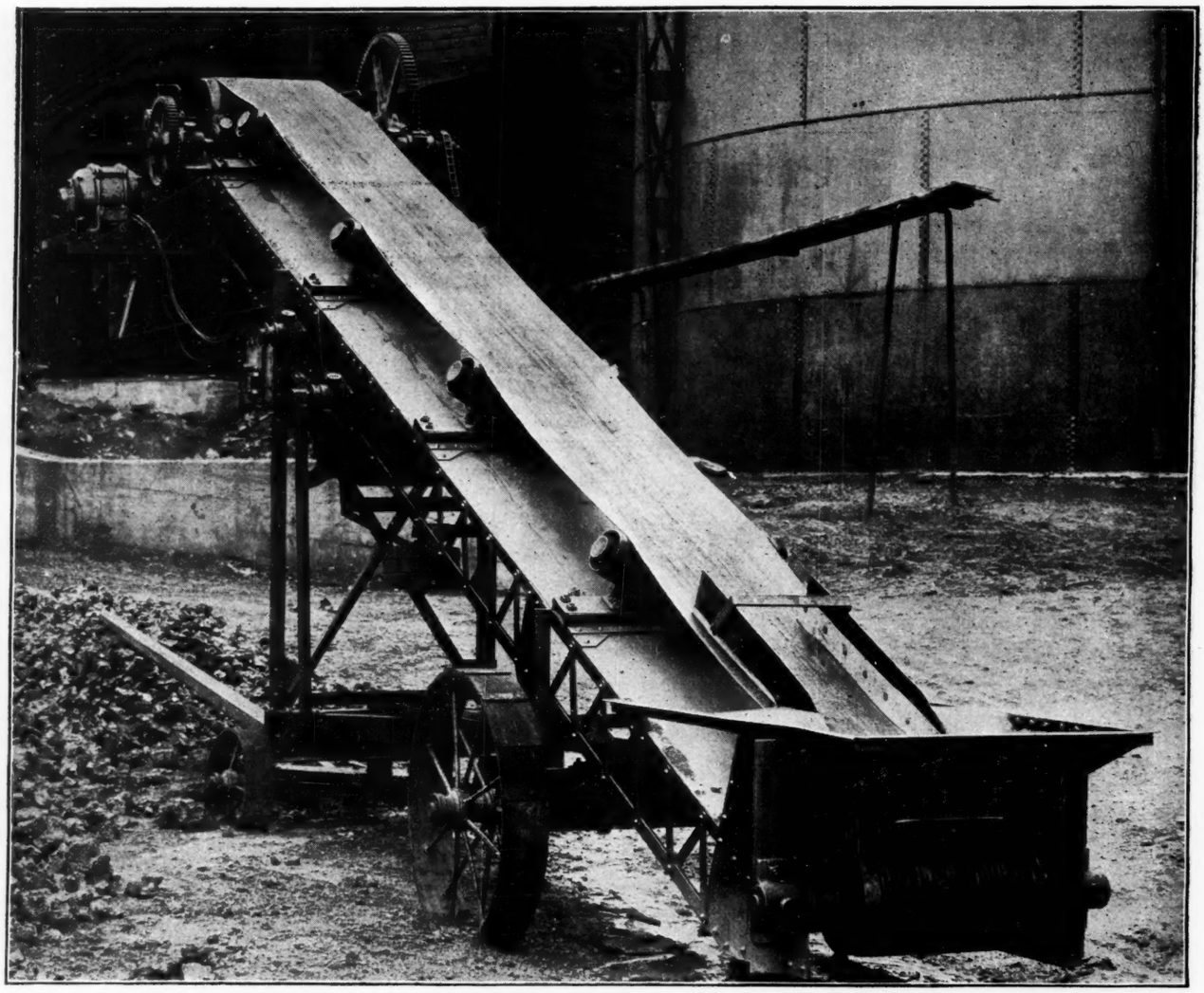
By L. R. W. Allison*

SYNOPSIS—Description of an efficient machine for loading coke. This class of material is exceptionally trying on machinery, and the apparatus described seems to have effectively overcome the mechanical difficulties.

The interlocking and adhesive characteristics of coke present a rather difficult problem in handling and loading. The great friction attending the action of coke on coke makes it practically impossible to dig into a pile of the material without an excessive crumbling and crushing of lumps and tearing apart of the formed mass, resulting in a large percentage of breeze.

Portable elevators of bucket-and-chain design, while effecting a more uniform method of coke loading, have evident disadvantages for practical and economical operation. As the buckets move through a pile of coke for loading, the natural tendency is one of a compressive and crushing nature; also, the material must be shoveled in front and on top of the buckets as they move over the lower sprockets of the endless chain. This, together with the rapid action of the buckets, necessitates a constant rehandling and consequent increase in labor cost. The operation of a centrifugal bucket elevator, usually at high speed, demands considerable excess power through the energy expended in the natural crushing and tearing action, which often ranges as high as 10 to 15 hp. beyond the actual requirements.

An interesting and effective portable loader and screen of belt-conveyor type has recently been devised to facilitate the handling and loading of coke at both large and small gas plants. This machine, which is shown in the accompanying illustrations, is known as the Lloyd portable coke loader; it obviates much of the difficulty attending the loading of cars or wagons and is a noticeable improvement on the portable bucket elevator haulage system noted.



GENERAL VIEW OF THE MACHINE FROM THE LOADING END

The successful use of belt conveyors in gas-plant operation, such as in moving coke from quenching chutes under

*170 Roseville Ave., Newark, N. J.

gas retorts to overhead storage bins, makes this type of machine the natural method for loading coke from the yards. The loader offers a low power consumption and high capacity; of steel-frame construction, it affords great durability and may be readily moved to any desired location.

General Construction Details

A conveyor belt of canvas or rubber, 20 in. wide, operates on a steel frame of latticed-bar construction, as shown in the accompanying line cut. Troughing idlers, arranged at an angle of 30 deg., are mounted on 5-in. channel-iron cross-pieces bolted to the trough plate. The belt is operated on 12-in. pulleys located on 23-ft. 10-in. centers, and is protected on the under side by the steel housing forming the trough plate, which has a width of about 2 ft. 9 in. The bottom, or tail, pulley is completely housed with sheet steel for protection against the coke screenings.

The loader is operated at an incline of about 23 deg., and is equipped with a 30-in. square feed hopper at the ground end. To provide for any slack or stretch in the belt an automatic take-up device is located on the under framework near the delivery end of the machine. This consists of a counterweighted pulley operating in steel guides.

At the delivery end of the loader, there is an overlip screen known as the Cross patented screen, built in steps, or sections, 12 in. long. The slots, running the full length of the section, are increased in width at the lower end to avoid clogging, thus making it unnecessary to stop the conveyor to clear the meshes. While either a shaking or stationary screen may be used, the former provides the best condition for the preparation of the coke as loaded; this is operated by means of two solid bronze eccentrics mounted on the countershaft, running at a speed of about 280 r.p.m.

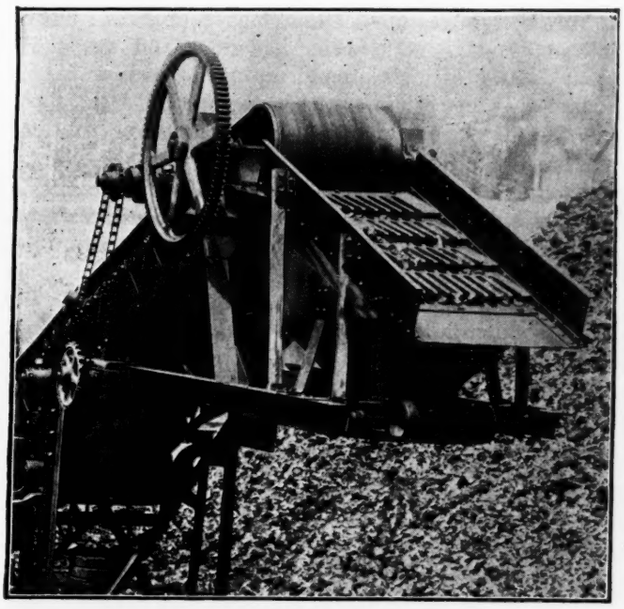
In employing the shaker screen, a 1- to 2-hp. motor is required to drive the conveyor, this being geared directly to the countershaft, thus eliminating the necessity for high-speed chain drives. With the stationary screen, a reduction in the motor rating to about ½ or 1 hp. is made. Cut gears are used for the motor drive.

To provide for the breeze, or fine coke, delivered through the hoppered spout connected with the screen, a flat belt 14 in. wide is arranged to receive this and convey it to a cart, or there is a simple chute to the ground, or other receptacle as may be desired. This auxiliary conveyor belt is connected with the countershaft by a chain drive and operates in the opposite direction to the main conveyor. By this arrangement the necessity for a storage hopper under the screen is eliminated, as well as the frequent interruption in operation due to stopping the machine to empty the container. The storage of breeze in a hopper is not satisfactory, particularly where conditions of moisture bring about a tendency to pack the sides.

Method of Operation

The conveyor belt operates normally at a speed of about 200 ft. per min. with a capacity for screening and loading a 2-ton wagon in from 3 to 4 min. with three men shoveling. Continuously operated, the machine has an aggregate capacity of about 35 tons per hr. from the storage pile. Any choking is practically impossible under normal operating conditions by reason of the elevating and conveying capacity of the loader.

In operation the coke falls with particular uniformity from the head pulley to the shaker screen, the largest lumps, those requiring but slight screening, dropping rapidly at the greatest distance from the feed belt on the screen and thence into the wagon or other receiver. The majority of the breeze falls on the near side of the screen, almost immediately passing through to the auxiliary conveyor belt below. In this way the intermediate sizes of coke pass over the entire length of the shaker and are thoroughly screened upon leaving the chute. In loading the machine by hand-shoveling, the coke is handled but once, thus materially reducing the average percentage of breeze.



DUMPING END, SHOWING SCREEN

The machine is mounted on a four-wheeled steel-frame truck which is provided with a wagon tongue for hauling by team to any desired location in the yard. The tongue may be swung back under the machine when in operation, making possible the loading of a wagon or car at right angles to the conveyor, or with end backed under the screen chute. In this way uniform loading is accomplished without necessity for frequent trimming.

COMING MEETINGS

The American Mining Congress will hold its 19th annual session during the week beginning Nov. 13, 1916, at Chicago, Ill.

Michigan-Ohio-Indiana Coal Association will hold its annual convention at Cedar Point, near Sandusky, Ohio, Aug. 1, 2 and 3. Secretary, B. F. Nigh, Columbus, Ohio.

Illinois and Wisconsin Retail Coal Dealers' Association will hold its next annual convention on July 26 and 27 at Madison, Wis.

Byproduct Coke Producers' Association of America will hold its first annual meeting in Boston, Mass., on July 14, lasting probably two or three days.

National Safety Council will hold its next meeting in Detroit, Mich., Oct. 17-20. Secretary, W. H. Cameron, Continental and Commercial Bank Building, Chicago, Ill.

Southern Appalachian Coal Operators' Association will hold its semiannual or second quarterly meeting at the Cherokee County Club, Knoxville, Tenn., July 21, 1916, at 12 o'clock. Secretary, J. E. McCoy, Knoxville, Tenn.

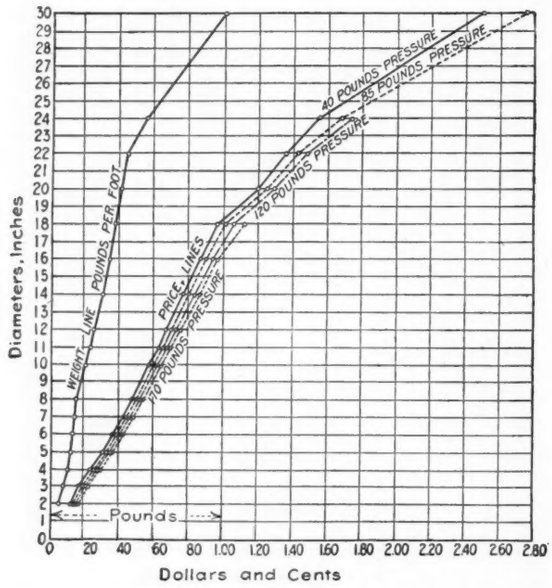
Prices of Machinery for Mines

SYNOPSIS—Computing curves are presented showing the actual costs of equipment f. o. b. factory and its weight and duty for use in making first estimates of installations at mines.

The prices given in this article were obtained and compiled from data procured at a colliery of medium size producing about 500 tons a day. During the latter part of 1914 certain features of the plant were getting out of date and costly. Acid water had done and was doing much damage to underground piping, to such an extent in fact that in certain parts of the workings the pipes only lasted two or three months, necessitating constant renewing.

A pumping problem had also developed in a section that had only recently been opened, the two steam pumps already in that part of the working being hard-pressed to keep down the water level. They were old and liable to give out at unexpected times, and when they did, the level in which they were placed was subjected to flooding.

A number of small surface hoists were also needed, and some larger ones were required for main- and tail-rope

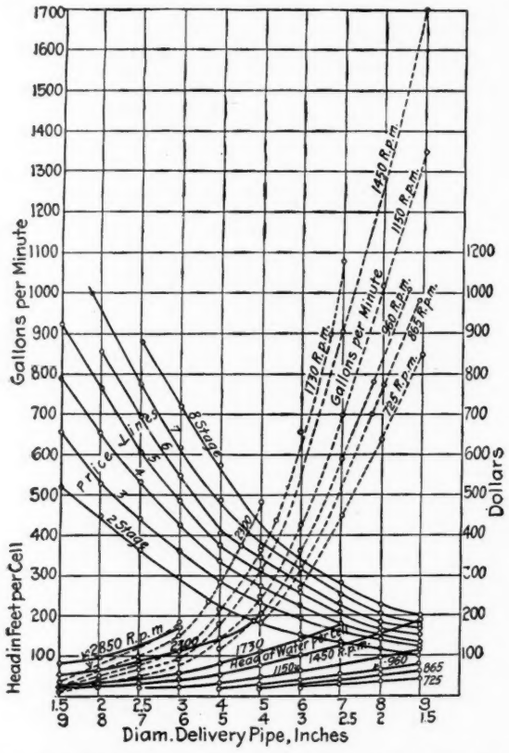


WEIGHT, PRICE AND BURSTING STRENGTH OF WOOD PIPE OF VARYING DIAMETER

haulage. Also underground and about the surface plant a number of small centrifugal and reciprocating pumps were needed, and these had to be purchased. Lastly, a new set of boilers was demanded, to replace those then being used.

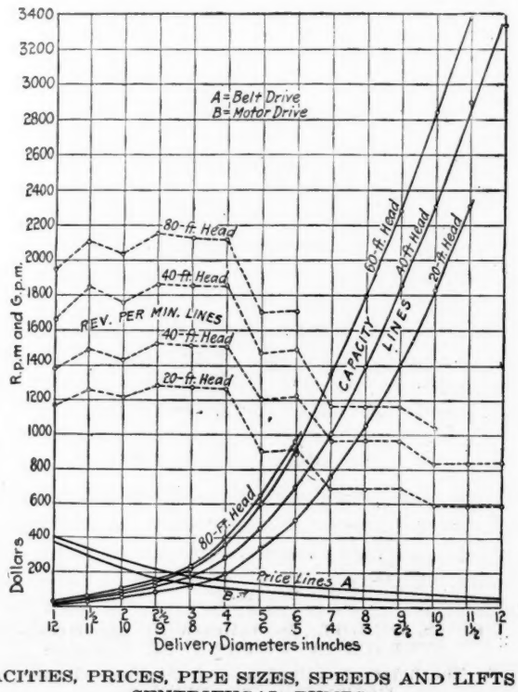
In general, much new equipment was needed, mostly of the smaller type, and when the mine, during the latter part of that year, became temporarily idle, advantage was taken of the slack time to replace the unfit material. In the course of purchasing the equipment, the office staff, mostly to keep itself busy, gathered together some interesting prices. Where possible these were afterward reduced to a unit basis, and shown graphically. Some of the figures that came to hand did not specially apply to the needs of the mine at the moment, but they have been added as being of interest to construction engineers.

The main condition to remember is that such prices continually alter, as the price of the raw materials used



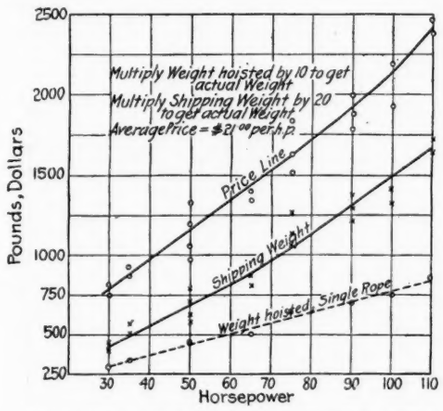
GRAPH FOR TURBINE PUMPS CONNECTING LIFT, SPEED SIZE OF PIPE, CAPACITY AND PRICE

The pumps for which the curves are made have single-pulley, single-standard drives or an extended bedplate for motor. With other drives the prices will be 5 to 7 per cent. higher.

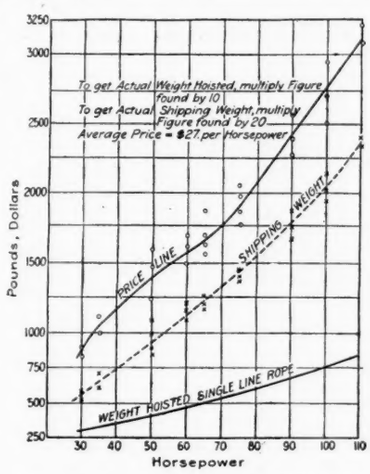


CAPACITIES, PRICES, PIPE SIZES, SPEEDS AND LIFTS OF CENTRIFUGAL PUMPS

in their manufacture rises and falls. But if one keeps tab on this rise and fall, it is possible to use the figures given with a sufficient degree of accuracy. As a basis for estimation they should prove interesting and useful. But perhaps their greatest usefulness will be in giving many mining men, students and small operators, mechanics and bosses, a means of arriving at a reasonably accurate idea of how prices run. Many men in their student days have wished to be able to get

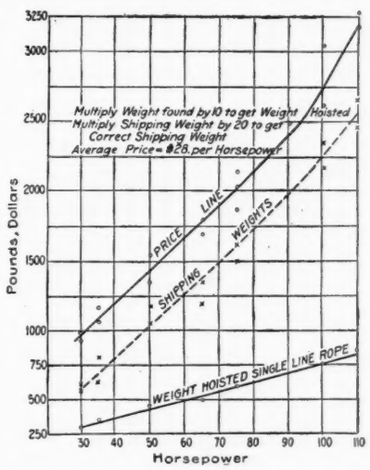


WEIGHTS, CAPACITIES, PRICES AND POWER OF HOISTS FOR SMALL SHAFTS AND INCLINES



WEIGHTS, CAPACITIES, PRICES AND POWER OF TANDEM-DRUM HOISTS

These hoists have two cylinders, two drums running in tandem and reversing engine



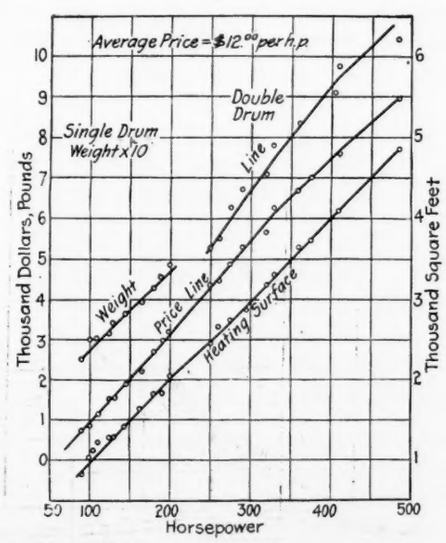
WEIGHTS, CAPACITIES, PRICES AND POWER OF PARALLEL-DRUM HOISTS

These hoists have two cylinders, reversing mechanism and the two drums are set end to end

closer to a comprehension of this subject. By chance, a man may have an estimate from the manufacturers of an engine of specified size, but that gives him no idea of how the price will rise or fall if a unit of one half or double the horsepower is to be purchased. Again, too many men collect catalogs of machinery, but even where this is done such figures are extremely misleading unless it is clearly understood and known what the actual discount off the prices quoted may be.

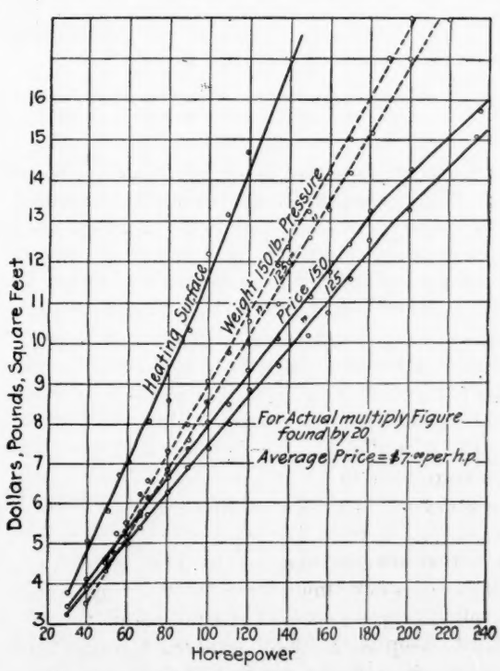
Frequently, it runs as high as 85 per cent. straight discount, and at other times it is arranged in the form of a chain of discounts such as 60 per cent. less 10 per cent. less 8 per cent. less 5 per cent. This archaic system no doubt is useful for the manufacturer, but before the mining man can understand it he must know how he is classed as a buyer, different ratings being entitled to different discounts.

Wood pipe was found extremely useful and efficient in acid water, and it solved the difficulties which had been encountered to the entire satisfaction of the management. By dint of a little quiet insistence and correspondence the figures given in the graph were secured, and they represent the prices for a line of pipe running from the lowest commonly made to the highest. All the prices in this as in all the other cases are f.o.b. the factory. As an example, imagine that the cost of a pipe of 10-in. diameter is wanted. You must first know the pressure that the pipe will have to stand; four are



PRICES, WEIGHTS, HORSEPOWER AND HEATING SURFACE OF WATER-TUBE BOILERS

The hoists described are of the two-cylinder, single-drum, reversing type.

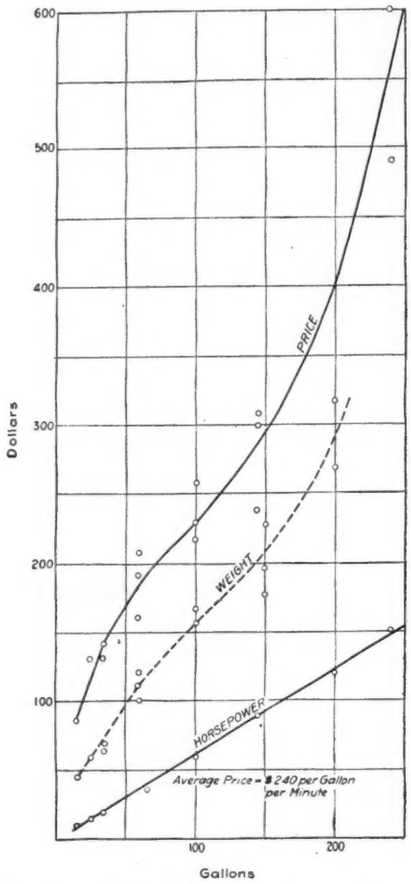


GRAPH FOR RETURN TUBULAR BOILERS

Connecting heating surface, power, steam pressure, weight and price.

given, but assuming again that an 85-lb. head will be ample, then a pipe of 10-in. diameter at this pressure costs 60c. per ft. and weighs 20 lb. per foot run. From the latter figure the weight of the complete shipment can be made out, and the cost delivered calculated.

The graph in this case is somewhat complicated. This is due to the number of factors that have to be considered, the head of water each cell will generate, the revolutions



POWER, CAPACITY, WEIGHT AND PRICE OF RAM-TYPE BOILER-FEED PUMPS

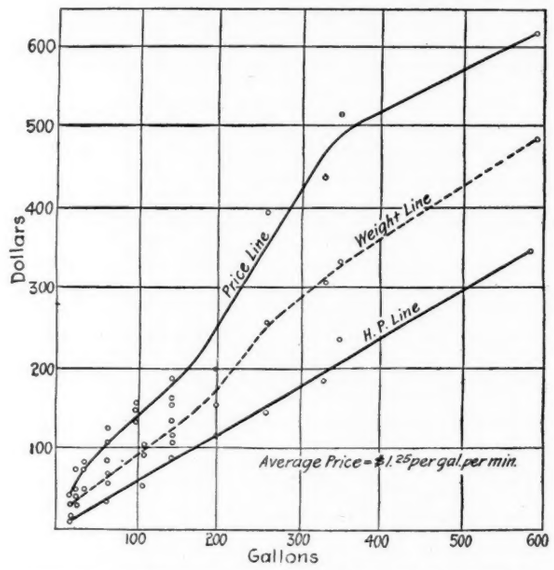
of the motor, the number of stages, and the gallons of water to be pumped. As a rule the prices are lumped into groups. Thus those shown are either single-pulley single-standard pumps for belt drives, or pumps with an extended bedplate for a motor drive. Other drives are either more or less expensive. For the most part they are more expensive than those given by 5 to 7 per cent.

Again, take an imaginary case—700 gal. per min. is to be pumped by a turbine pump with a drive running at 1,150 r.p.m. Such a pump will operate at a pressure of 80 ft. of water per cell. To this figure has to be added anything extra for pipe friction, such as length of pipe on slopes, which figures can be obtained from the tables published. A 7-in. delivery pipe is what is wanted with the quantities specified. The total height is 600 ft., which will require an eight-stage pump. This with a 7-in. delivery can be purchased for $880.

The centrifugal pump is not so complicated as the turbine. The prices have been arranged in convenient groups, which allows of the construction of a simpler graph. To avoid clashing of lines the price curves have been plotted in the opposite direction to the capacity lines in the graphs for both centrifugal and turbine pumps.

The remainder of the graphs dealing with water-tube boilers, return-tubular boilers, small hoists, and boiler-feed pumps, are practically self-explanatory.

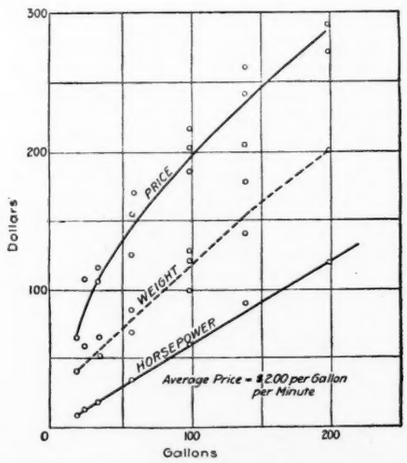
Finally, it may be observed that the foregoing graphs should be of service in estimating promptly and accu-



PRICES, WEIGHTS, POWER AND CAPACITIES OF BOILER-FEED PUMPS, PISTON TYPE

rately the cost of certain pieces of plant. If the purchase is actually contemplated greater accuracy is required, and reference should then be made to a price catalog containing the discounts obtainable. When the equipment becomes the subject of a requisition it is time to get actual makers' prices on the particular piece of machinery to be operated under the specified conditions.

Obviously, however, mining men cannot forever be asking for quotations when asked to make an estimate for a renewal of this or that piece of plant, and, equally, they cannot carry around with them a trunk full of catalogs properly marked with the discounts allowed. Some



CAPACITIES, POWER, WEIGHT AND PRICE OF PISTON-TYPE BOILER-FEED PUMPS

These pumps are also equipped with pot valves

concerns can always buy cheaper than the figures shown, perhaps because of the large quantity of material they purchase or for some other reasons, while others pay more, probably because they have to purchase through two or three intermediaries. The colliery mining 500 tons a day without any special buying advantages purchases at about the figures given.

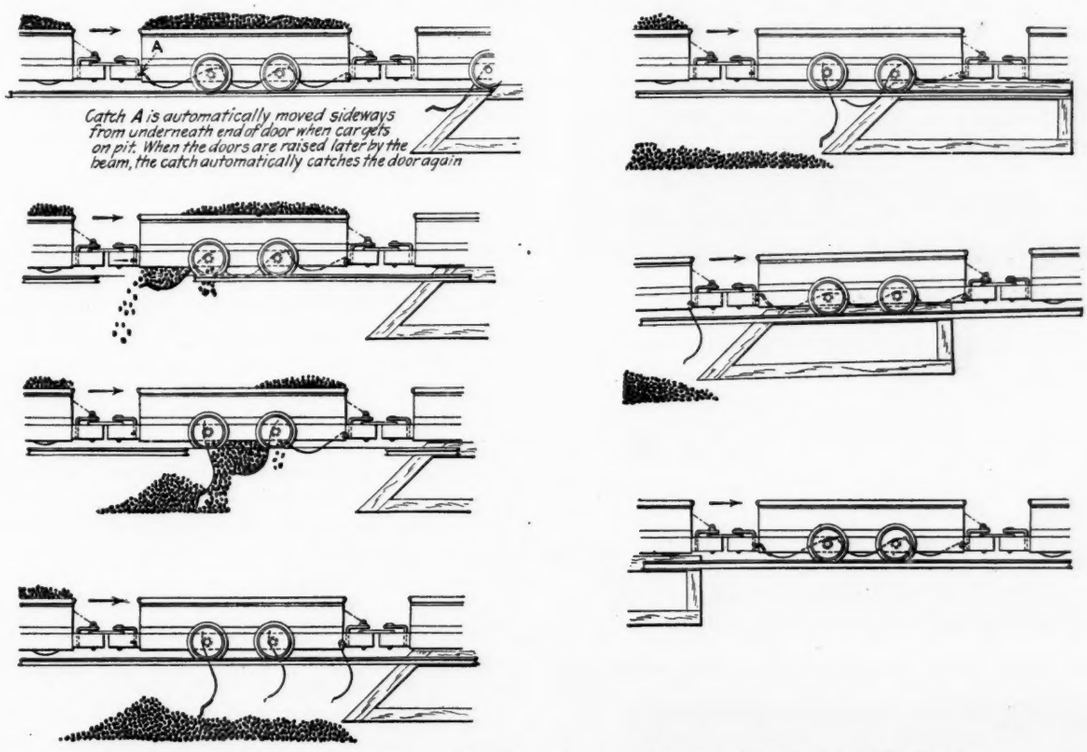
Automatic Drop-Bottom Mine Car

The accompanying photographs and drawing show a new and efficient type of mine car manufactured by the Sanford-Day Iron Works, of Knoxville, Tenn. Patents on the construction of this car have been applied for. Sixty of these cars, the first manufactured, have been in use at the mines of the First Creek Coal Co., Typo, Ky., for several months.

The cars are of all-steel construction except the bumper blocks, which are made of oak covered with steel. This particular car has 14-in. "Whitney Wonder" roller-bearing wheels on 2¼-in. axles for 48-in. gage of track. It stands 26½ in. from rail to top of sides. The side plates are only 7½ ft. long and the width across top is but 58 in. inside, yet the car has a capacity level full of 51.4 cu.ft.

The dumping is entirely automatic, requiring absolutely no labor on the tipple. The cars are dumped without uncoupling and without stopping the trip. The motor pulls the car trip over the dumping pit at a speed of 4 to 6 mi. per hour. Before the cars hit the dumping-pit trigger, they are all loaded. As they go away they are all empty and the doors latched ready for reloading without the hand of man having been touched to them. The motor, without stopping except to reverse directions, can go right on back into the mine with the same string of cars. They have been unloaded and doors raised and latched at a speed of 15 to 20 cars per minute without fuss or bother, and with the electric motor furnishing the small amount of power required. In fact on a 2-per cent. grade over the dumping pit, the cars would dump and the doors operate without the assistance of mule or motor.

The bottom doors in each car are automatically tripped when it comes to a certain place over the pit where the gate-latch trigger has been placed. The end door holds up the second door and the second holds up the third. The end door is supported by a wrought-iron catch. At a certain point this catch is moved sideways by the automatic trigger. The end door then falls, discharging the coal above it. In falling this door releases the support to the end of the second door, and it in turn falls and discharges. In the same way the third door is released by the falling of the second, and it drops and discharges. There is nothing complicated about this. The edge of one door drops, this edge simply comes out from under the door next to it and allows it to fall also.



SUCCESSIVE STEPS IN THE OPERATION OF THE AUTOMATIC DROP-BOTTOM CAR

In a run of 156 carloads the total amount of coal dumped was 359 tons, or an average of 2.3 tons per car. The car weighs 2,225 lb. empty.

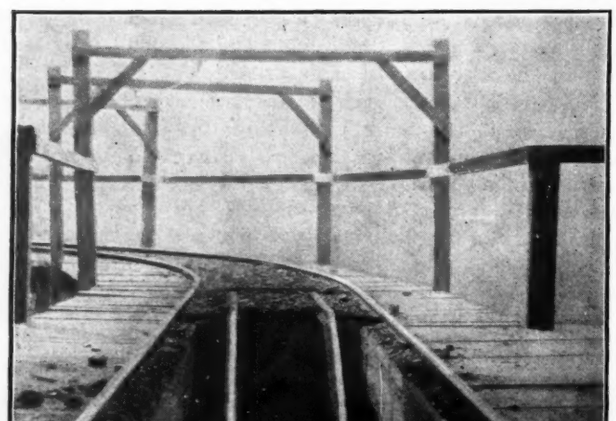
Being short and low and yet of such large capacity and easy to load, the car proves exceedingly attractive to the miners, who it is reported, are leaving neighboring mines and coming to First Creek on account of the ease of loading this car.

The ends are solid, of course, and there are no gates to keep up or to get knocked out of shape.

The car is moving ahead as the doors drop and, after discharging, it soon comes to the end of the pit, beyond which, between the rails, is placed an inclined timber, or rail. As the motor pulls the car onward, it passes over this knuckle and the doors one after another are raised into

their normal positions—in fact, slightly above. When the car has come to the end of this knuckle between the rails, the doors of course start to drop, but while passing over this knuckle, the latch holding up the end door has automatically caught and the door cannot drop. The doors lap over each other and the end one cannot drop until the trigger operating it is again sprung, allowing this door to fall. All this is simple, easy and effective.

In actual operation it is found that the doors in dropping or closing show no tendency to bang against each other or to jam in any way. The entire operation is quiet, easy and rapid. The coal slides down the curved doors



THE FORWARD END OF DUMPING PIT

into the pit as if on a chute, and the breakage is reduced to a minimum. This type of car certainly increases materially the percentage of block in any coal.

The First Creek Coal Co. reports the following reduction of mining costs by the use of this drop-bottom car, figuring on an output of 400 to 500 tons per day or more: (1) A saving of about $6 per day on the tipple; (2) about 10 per cent. fewer cars are required to produce a given tonnage of coal on account of the quick return of the trips to the mine; (3) much less breakage of coal; (4) the saving of installation and maintenance of rotary or crossover

TOP VIEW OF THE CAR

dumps; (5) a saving in mine-car upkeep; (6) loading cost is lessened by using a lower car of large capacity; (7) derailments are reduced in number since the center of gravity of the car is low.

To verify these figures, anyone is invited to write to the car owners or to the Sanford-Day Iron Works, of Knoxville, Tenn., or to inspect the cars in use at the mines of the First Creek Coal Co.

This same type of car is also designed for cheaper construction with wood ends and sides, but with steel side sills and steel bottom doors. These doors are of short curved steel plates reinforced with steel angles. This makes a stiff construction which will not get out of shape.

Mechanical Jack-of-All-Trades

As a general rule he who is a jack-of-all-trades is master of none. It is often said that this is an age of specialization—an age wherein to be eminently successful either a man or a machine must do but one thing, but do that with efficiency. All rules, or practically all of them, have their exceptions, and occasionally both men and machines are found that are veritable jacks-of-all-trades and good at each. If the success of such men is analyzed, it will usually be found, however, that the individual has merely employed the same faculties on different work. The same traits of character exercised in different channels, impelled by different motives accomplish success regardless of what may be the ultimate object in view.

The same may be true of a machine—using the same raw materials in practically the same manner, widely varied but uniformly successful results may be accomplished. A good example of this versatility of use is furnished by the cement gun. Although this machine invariably handles the same or practically the same materials (cement, sand and water), the uses to which the resulting gunite may be advantageously applied are legion.

Some of these uses to which gunite has been put around mines and mine plants follow:

Shafts may be lined with gunite, thus protecting the timbers from rot or decay and also from fire, or the steelwork from corrosion.

Flues may be lined with gunite as a protection from corrosion or the deteriorating effect of the hot gases. Such a lining has the added advantage of rendering a leaky flue tight. This work has been done by one large company at a cost of 25c. per sq.yd.

The cement gun may also be used for relining and repairing byproduct coke ovens without shutting the oven down and while it is still quite hot. For this purpose a special long nozzle has been developed.

The upper portion of steel smoke-stacks may be advantageously lined with gunite where the lower portion is lined with brick.

Many bunkers in power plants have been successfully lined with about 2 in. of gunite, thus protecting the metal from the corrosive action of the wet coal, as well as from the constant wear occasioned by the material always moving downward in the bunkers. Bunkers so lined are waterproof, and the firemen working below them are not subjected to the annoying drip often present where wet coal is stored in steel bunkers not thus lined.

Gunite may also be successfully employed in relining and preserving storage-water tanks, those used for supplying coke yards, or the fire mains of the mining plant. It

is immaterial in this case whether the tank be constructed of wood or steel. It may be successfully protected in either case.

Plain or reinforced concrete dams may be thoroughly waterproofed by a comparatively thin coating of gunite on the outer surface of the structure.

Practically any concrete structure, such as foundations, stairways or buildings, may be waterproofed and thus rendered immune from the scaling effect of frost by a thin covering of gunite.

Steel structures around the mines, such as tipples, breakers, bridges, viaducts and all structural steelwork in general, may be thoroughly protected from the elements by gunite either plain or reinforced.

Ditches and aqueducts through porous earth or rock may, by lining with gunite, be rendered water-tight.

The cement gun has also been employed in the preservation of mine timber underground, the stopping of fissures which threatened to flood the mine workings, and the stopping of small air leaks in the fan drift, also for lining this passage, reducing the air friction.

Another and perhaps one of the greatest uses of this machine around the mine is in the construction of houses and buildings in general. Gunite applied to a house as an outer covering is more dense, more durable and considerably cheaper than stucco applied by hand. In a building of this construction it is only necessary to erect the studding, place the door and window frames, put on the outer trim, such as cornice and corner boards, cover the structure inside and out with tar paper, over which may be placed any of several varieties of wire netting—for example, ordinary poultry wire—and turn on the cement gun.

Or if it is desirable, the granite may be applied only on the outer surface of the house, while ordinary lath and plaster may be placed on the inner walls. A building thus constructed is durable, waterproof, dampproof, nearly verminproof and to a large extent fireproof, the reduction of insurance premiums amounting to about 30 per cent. for a building of this kind, as compared to the ordinary frame structure.

The same type of construction may be applied to stables, shops, fanhouses, warehouses, stores, offices, oilhouses, powder magazines, substations, pumphouses, etc., such buildings being light, cheap, quickly constructed and durable.

The cement gun has also been successfully employed in the repairing of ordinary beehive coke ovens, the relining of sewers, and for many other purposes.

Another use to which it may be put underground, and one which is extremely important should the emergency arise, is the construction of stoppings, either permanent or temporary, but particularly those for sealing off a mine fire. In such an emergency speed, not expense, is the item of greatest importance. For such a stopping it is only necessary to construct a rough timber frame, which may be covered with tar paper or, if desired, with rough boards over which ordinary poultry wire may be stapled. The cement gun applied to such a stopping renders it absolutely air-tight, since the joints between the stopping proper and the walls of the passage in which it is placed are completely sealed up with the gunite. Such a stopping is also vastly cheaper to construct than those composed of two plank walls between which a filling of clay is packed.

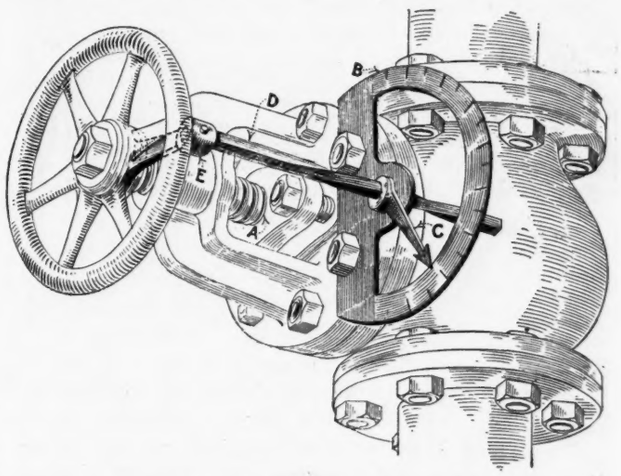
The foregoing are some of the uses to which the cement gun has been put around coal mines. The list is by no means complete, and new uses are being discovered for it almost daily. Enough has been said, however, to show the great versatility of this apparatus at the mine.

An Ingenious Valve Indicator

The need for an indicator or telltale to show the exact position of a throttle or other valve, particularly where it is not readily accessible for trial, is often experienced by engineers. The writer recently saw a simple and ingenious device for this purpose, which is applicable to any type where the stem travels with the valve. Such a contrivance is used on the throttle valves of the large reciprocating units at the Pratt Street power house of the United Railways and Electric Co., of Baltimore, Md., and was designed by Malcolm Wright, chief engineer.

The construction and operation are shown in the illustration, where *A* is the valve spindle and *B* a graduated quadrant fastened rigidly to the body of the valve. The pointer *C* is fastened to the quadrant, but is free to revolve over its face. The center of pointer *C* is pierced by a square hole that fits neatly over a square rod *D*.

The rod *D*, through a clamp *E*, is made to follow the movement of the valve stem in and out as the valve is operated, and the part of *D* that engages the pointer *C*



INDICATOR ATTACHED TO VALVE

is twisted so that from the open to the closed position of the valve the pointer *C* will travel 180 deg. over the quadrant.

This indicator is extremely simple to make, all the parts apparently being forged by hand and requiring little machine work. It should be useful on main steam and other inaccessible valves where a positive indication of the position of the valve is desired to be determined from a distance.—S. F. Jeter in *Power*.

The Environs of Keshan in the Province of Adrianople, Turkey, have been prospected for coal somewhat more thoroughly than other districts of European Turkey. The beds are found at the edge of a synclinal sandstone basin, 13 km. in diameter. From a point 1.5 km. northeast of Keshan a single seam was traced for a distance of 5 km. along the southern edge of this basin at about 165 m. above sea-level. The coal mined here is bituminous. One of the seams worked was about 1 m. thick and had the characteristics of cannel coal, burning with a long flame and emitting little smoke.—Leon Dominan in Transactions of A. I. M. E.

Compressed-Air Coal Cutters in Canadian Mines

By S. W. Symons

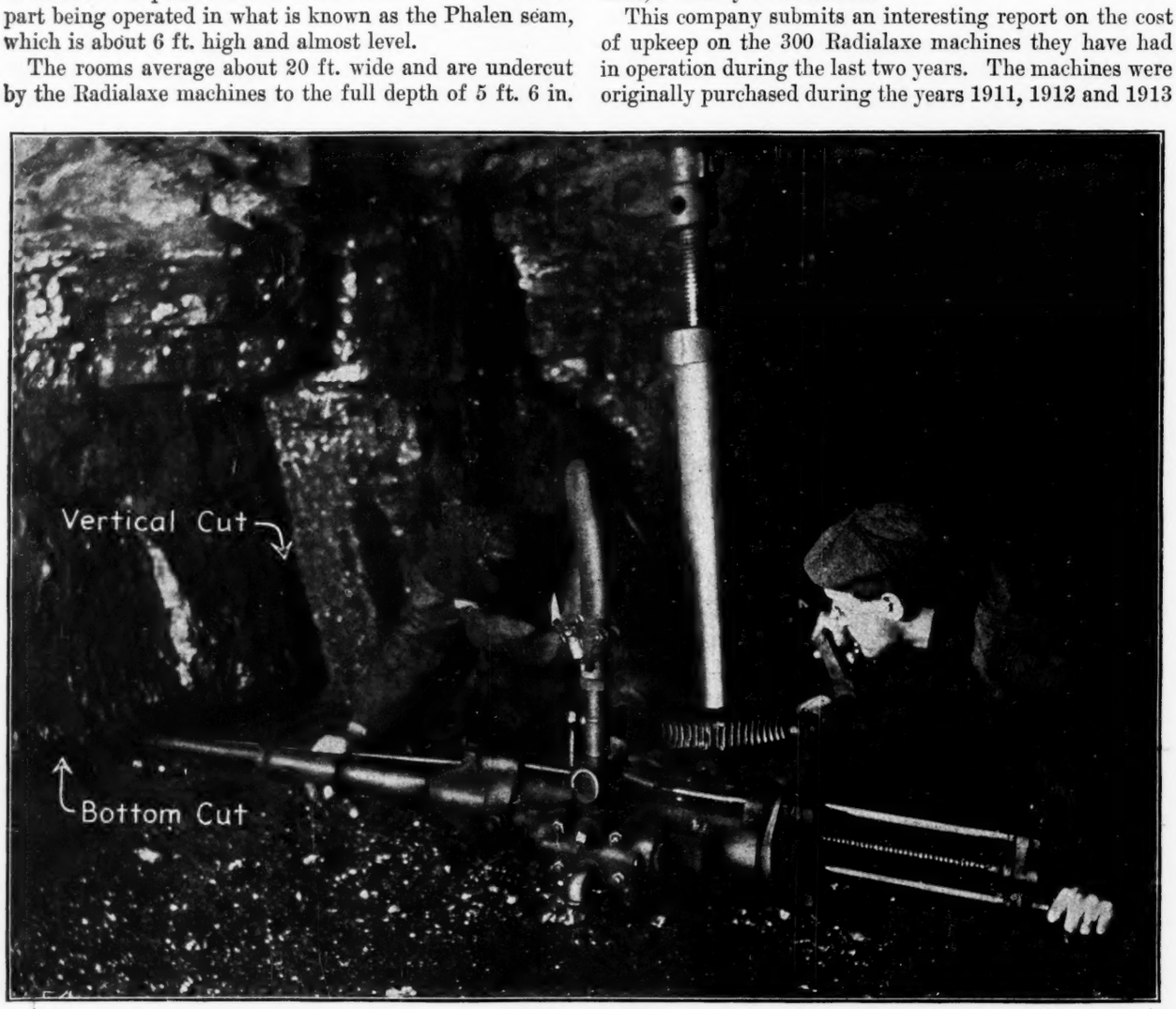
In the bituminous mines of western Canada the compressed-air column-mounted coal cutters of the Radialaxe type have made a reputation for themselves owing to their low cost of upkeep and operation. One of the largest mines using Radialaxe machines is that of the Dominion Coal Co. at Cape Breton. These cutters are for the most part being operated in what is known as the Phalen seam, which is about 6 ft. high and almost level.

The rooms average about 20 ft. wide and are undercut by the Radialaxe machines to the full depth of 5 ft. 6 in. or 6 ft., and the coal is brought down by the three-hole system. One hole, known as the plug hole, is placed about the center of the room, 4 ft. from the bottom, and another is drilled at each corner of the room about a foot from the rib and the same distance from the roof. The center, or plug, hole is shot first, and the two corner holes are shot together.

The amount of coal that the machine will cut of course varies with local conditions, depending on the hardness of the coal, the presence of sulphur balls, the condition of the roof, bottom, etc. At the Dominion Coal Co.'s mine the machines cut from five to ten rooms per shift. The coal is all cut by contract, the machine miner being paid by the ton and paying his own helper, so it is rather difficult to arrive at the maximum capacity of the machines. The machine runner makes anywhere from $8 to $15 per day clear of expenses, and with comparatively light work. If he has good luck and good air pressure, he may get ten rooms finished in five or six hours.

In a test recently conducted between an air-driven short-wall chain machine and the Radialaxe (Ingersoll-Rand No. 37 Type), the former cut 46 rooms 30 ft. wide in 16 shifts and the Radialaxe cut 84 rooms 30 ft. wide in the same time, or nearly twice as fast.

This company submits an interesting report on the cost of upkeep on the 300 Radialaxe machines they have had in operation during the last two years. The machines were originally purchased during the years 1911, 1912 and 1913 and represented an initial outlay of something like $50,000. They have seen continuous service ever since.



VIEW SHOWING THE RADIALAXE MAKING AN UNDERCUT

The cost of repairs was taken on three different occasions—the first time in the Lingan district only, covering the operation of 200 machines for a period of six months, the average cost per machine per month being $1.50.

The second cost was taken about a year later and covered the total number of machines that had run for the period of one year. This showed the cost of repair to be $1.35 per machine per month.

The third cost has only just been completed and covered a period of one year on the 300 machines now in operation. This showed a repair cost of $1.34 per machine per month.

The majority of these machines are four or five years old, while a few are three and some two years old.

The construction of the Radialaxe follows, in general, standard rock-drill practice, having been developed from the old-time piston drill. The drill proper is a long-stroke type, the maximum stroke being 10 in., controlled by a combination tappet and air-thrown valve which allows a variation in the length. The drill is mounted on a shell having a feed of 20 in., and the whole is mounted on a column that allows of swinging the bit radially in either a horizontal or vertical plane. This swing mechanism is operated by worm gearing controlled by the operator and can be placed in any position on the column.

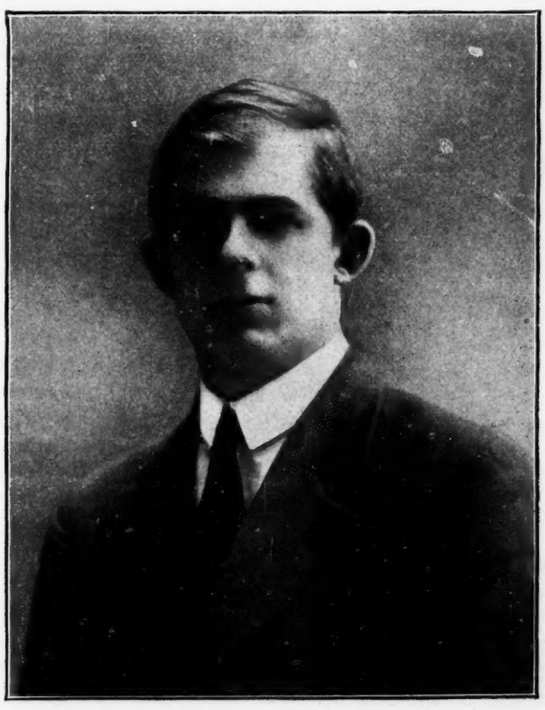
The machine is built entirely of steel so as to reduce the weight to a minimum and provide for easy handling. At 80 lb. air pressure it is capable of striking 600 blows a minute, and the air consumption is approximately 150 to 200 cu.ft. per min.

Who's Who In Coal Mining

A. G. Blakeley

One of the young men who is forging to the front in his particular field of coal mining is A. G. Blakeley, chief chemist of the Philadelphia & Reading Coal and Iron Co. He was born in Chester, Penn., in 1885, and graduated from the University of Pennsylvania with a B.S. degree in chemistry in 1906.

Mr. Blakeley is not a wanderer in the business sense of the word, for immediately on leaving college he became affiliated with the Philadelphia & Reading Railway Co. as assistant chemist. This was back in 1906, and he is still with the same interests. The only change he has made was to transfer from the railway company in Reading, Penn., to the coal company in Pottsville. That was nine years ago. When you can work for W. J. Richards nine years and get away with it, you have to know something about the thing you are doing.



ABRAHAM G. BLAKELY
Chief Chemist, Philadelphia & Reading Coal and Iron Co.

From the day he arrived in Pottsville Mr. Blakeley has had charge of the chemistry department of the P. & R. C. and I. Co. He also has been in charge of the company's Draeger rescue apparatus, and the efficiency of the Reading company's first-aid men speaks well of his competence as an instructor in the handling of such apparatus.

Some of the most notable work he has done relates to the treatment of various boiler waters, which is an ever-present problem in the anthracite mines.

Mr. Blakeley is a member of the American Chemical Society, American Society for Testing Materials, Society of Chemical Industry, Franklin Institute, American Highway Association and Illinois Water Supply Association. He also belongs to the Pottsville Y. M. C. A. The American Society for Testing Materials has honored him with a place on the following committees: Specifications for Coal, Specifications for Coke, Specifications for Cast Iron and Castings and Specifications for Cement. He is one of the young men in the industry we will hear more of before long.

Box-Car Loaders at Gebo, Wyo.

The Owl Creek Coal Co., of Gebo, Wyo., some time ago faced the problem of loading friable coal into box-cars at a reasonable cost. The hand method was becoming expensive, required too many men and was too slow to get maximum efficiency when the selling price was considered. In brief, the cost of production was eating up what little profits might be in prospect.

Box-car loaders, so far as the company knew then, were expensive both as to initial cost and upkeep. Moreover, all the loaders in the knowledge of the company were injurious not only to the coal but also to the cars into which the coal was loaded.

The solution of the problem was sought from the experience of other operators. Before the company had gone far with its research, it was constantly met by the statement, "Before you buy a box-car loader, investigate the Manierre." The recurrence of this advice forced the management to consider the machine named and investigate its merits.

The investigation of the machine was exhaustive, but showed that the operators who used this loader were satisfied. The evidence in favor of it was so strong that negotiations were opened with the manufacturers through their local representatives, and two loaders were installed—one for loading the largest-sized lump coal and one for loading nut.

These machines are standing up under the work well and there is apparently no reason why they should not give good service for several years. Each handles its proportion of a tonnage amounting to over 1,500 gross in 8 hr. How much more they can handle is unknown, as they have never been crowded.

The purchasers are well pleased with the results obtained and are contemplating the installation of an additional machine to take care of another grade of small coal now handled by hand.

In addition to handling coal successfully and making a nice preparation, the purchasers have been able to reduce the loading force by about 10 men per day, which will soon pay for the loaders.

New Tipple at Glouster, Ohio

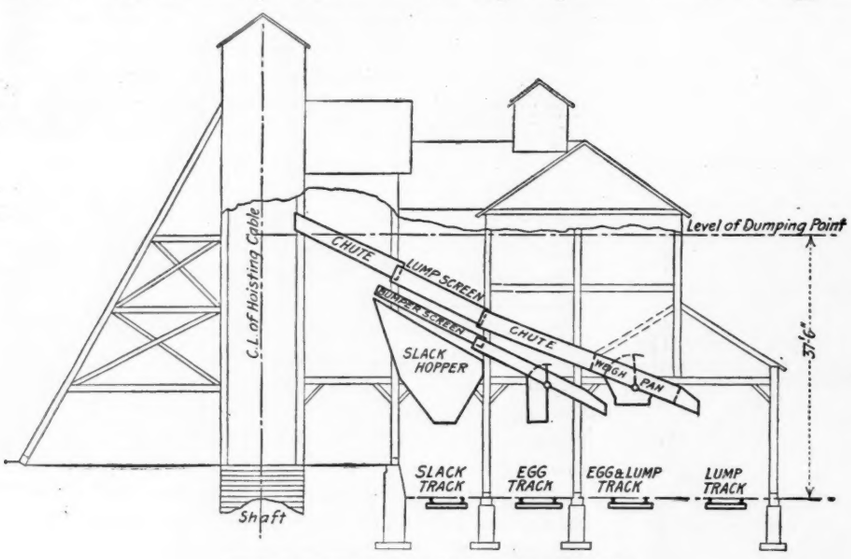
By Miner Raymond*

SYNOPSIS—In order to comply with the Greene law a modernization of the tipple was necessary. This was accomplished, making use of a maximum amount of the original tipple and raising the dump only 2 ft.

It is not only in a recreational sphere that puzzles are to be found, as many creative engineers can testify. A real problem confronted the Sunday Creek Coal Co. when the decision was made to remodel the tipple of Mine 256 at Glouster, Ohio, now operated by the Continental Mining Co. This step was made necessary by the passage of the Greene Screen Law in Ohio, which provides that the miner shall be paid on a run-of-mine basis instead of on a lump basis as was formerly the case.

The problem developed by the Sunday Creek Coal Co. was to equip the plant with modern machinery throughout, stipulating that the location of the tracks and the kind of coal loaded thereon were to remain fixed. Furthermore, the location of the dumping point was to be changed as little as possible and a maximum amount of the old structure was to be used. The larger sizes were to be separated from the nut and slack, picked, and remixed with the nut and slack for weighing as run-of-mine.

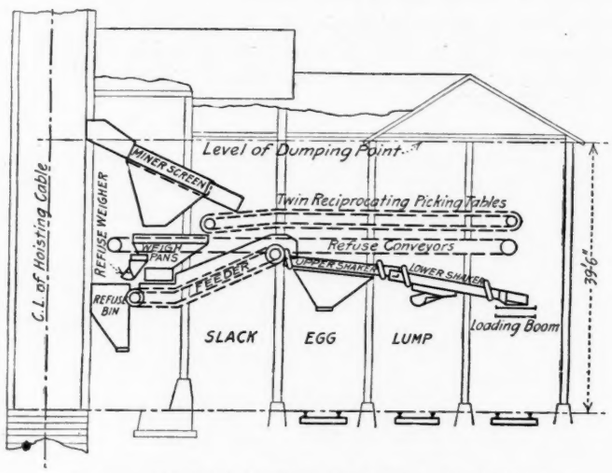
The accompanying illustrations show roughly the tipple "before and after" the operation of modernizing the plant.



CROSS-SECTION OF ORIGINAL TIPPLE

The equipment was designed and furnished by the Webster Manufacturing Co., of Tiffin, Ohio, with the cooperation of G. H. Dukes, chief engineer of the Sunday Creek Coal Co. The three outer tracks have remained in place, and cars on them receive the same coal as before. The remaining conditions were met by a compact installation which involved raising the dumping point only 2 ft. so as to maintain proper clearances over the rails.

The shaft is of two-compartment construction, raising cages in each compartment alternately. From the cages, through picking operations, up to the feeder that supplies the screens, this twin system is adhered to. The coal, dumped from one of the two cages, passes over a 1¼-in. bar screen, the nut and slack dropping into a hopper below and the egg and lump passing onto one of the twin picking



CROSS-SECTION OF TIPPLE AFTER CHANGES

tables, which are of the steel-apron type. As a cage dumps, the operator starts the motor driving the table on that side and the egg and lump is moved forward until the entire charge is on the table. The conveyor is then stopped, and the coal is attacked by a crew of pickers. The discarded chunks are tossed through openings in the floor onto scraper conveyors, which carry the refuse into a hopper, where it is weighed and from which it passes into a refuse bin close to the shaft. When running at full capacity, 25 sec. is allowed for picking.

After the larger coal is cleaned, the conveyor is started in a reverse direction and the lump and egg is carried back into one of two weigh pans where the slack has been already collected, and the whole is weighed in accordance with the Greene Law. This cycle is now repeated with coal from the cage in the other compartment of the shaft, the two weigh pans dumping alternately into a hopper between them. The coal is taken from this hopper by an inclined apron conveyor and fed uniformly onto the screens.

The screens are the chief feature of the installation. As can be seen from the drawings, the vertical space available for the screens was limited—as a matter of fact, it is 10 ft. 4½ in. from the top of the lump-loading boom to the under side of the picking tables. In this space it was necessary to provide also for the discharge of the feeder to the screens. The result was that the Webster engineers began experimenting with flat screens. After

*Tiffin, Ohio.

GENERAL VIEW OF TIPPLE

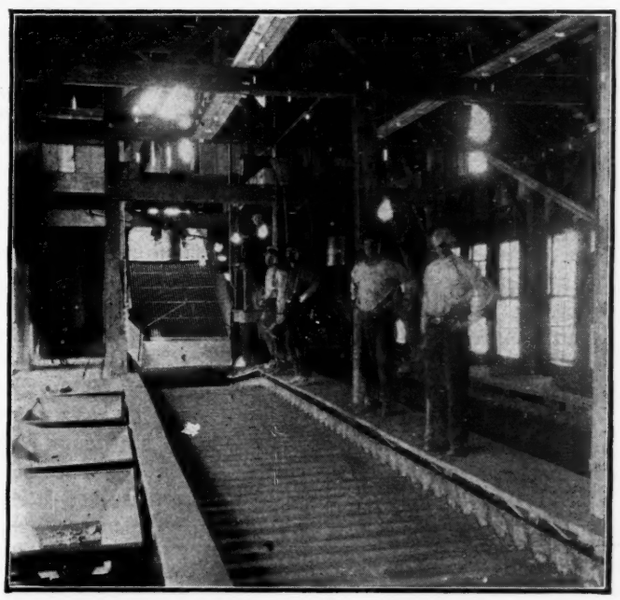
some study and the erection of a model in the factory yard, a design was finally adopted involving an upper shaker 15 ft. long by 5 ft. wide fitted with ¾x1x12-in. Cross patent lip screen for passing slack and nut, and a lower shaker 14 ft. long by 7 ft. 6 in. wide fitted with 3x3½x8-in. Cross patent lip screen for passing the egg. The upper screen is set on a 5-deg. and the lower on a 10-deg. slope, making the treads of the screen steps practically level.

The screens are driven by standard eccentrics and connecting-rods, but the method of suspension is unique. Short hangers are employed, being but 24 in. between shaft centers. They are so placed that when the screen is in mid-stroke (its position at rest), the lower, or screen end, is 3 in. ahead of the upper, or pivot-end. As the stroke is 6 in., this means that at the beginning of the forward motion of the screen, the hanger is vertical and the screen floor is in its lowest position. The coal is now carried forward and upward so that at the end of the stroke, it has been advanced 6 in. and raised about ¾ in.

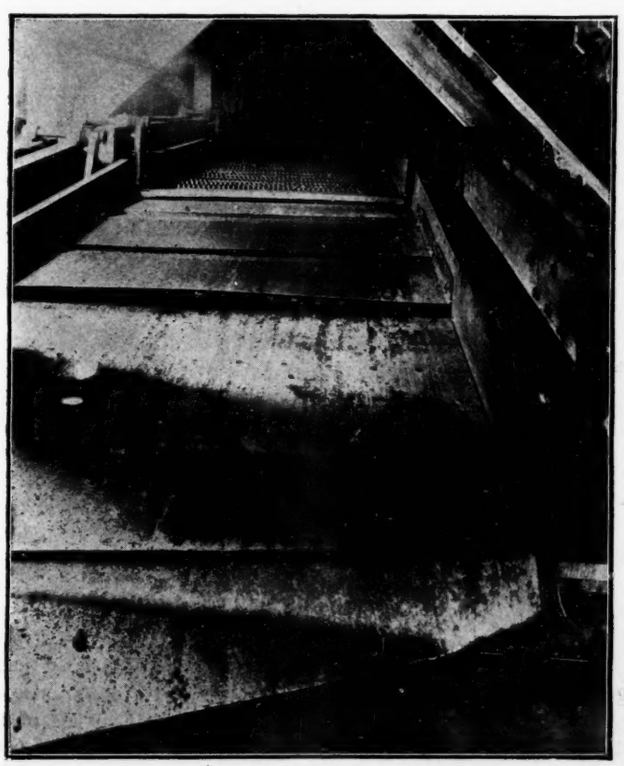
The screen now starts its back stroke and cuts away from under the coal, but as the coal has acquired a certain momentum, it continues to travel forward with a slight downward glide at a decreasing speed until again picked up by the next advance of the screen. There is no sliding between coal and screen plates on the back stroke and no complicated mechanism to accomplish a quick return. The arrangement is an economical one as to the power required.

No data are available as to the power consumed by the screens alone, as all of the tipple machinery, the picking tables excepted, is driven from a common lineshaft by a 10-in. belt running 1,570 ft. per min. It is estimated, however, that these screens require no more than 15 hp.

For loading lump on the outer track, a Webster loading boom is used, while the egg is loaded from a hinged car chute on the middle track, which is supplied by the lower screen. The inner track is used for slack, which is drawn from a hopper under the upper shaker. The plant is designed to handle 200 tons per hour, but has never been tried at this rate.



TWIN PICKING TABLES



END VIEW OF SHAKING SCREENS

Operations were resumed with the new tipple May 25, and D. H. Williams, who is in charge of the operations at Glouster, states that during the first 10 days of June the plant had easily turned out as high as 1,360 tons of marketable product. He has confident expectations of increasing that figure to 1,600 tons in the near future. A goodly percentage of coal is in large lumps, and a car of these as it leaves the loading boom is a subject for compliment to all concerned in its production.

Bureau of Mines' Approval

The Bureau of Mines issued on June 17 of the present year an approval of the electric safety-cap lamp manufactured by the Concordia Safety Lamp Co., Inc., Fulton Building, Pittsburgh, Penn. This lamp is thus approved for safety, practicability and efficiency in general service, the award being recorded as approval No. 15.

Impure Character of Some Anthracite Seams—At one colliery in the vicinity of Scranton, where a 6-ft. vein is worked, only 18 in. of the coal can be prepared for the market.

Rock Excavation in Coal Mines

By C. Jackson*

SYNOPSIS—Describes the five leading forms of rock work in mines and the three types of electrically operated drills used for this purpose—compressed-air drills in which the power is secured through the medium of a portable motor-driven compressor plant, motor-driven percussive drills and rotary motor-driven rock augers.

In order to facilitate coal-mining operations, the excavation of hard rock is a necessary and important factor in a majority of the coal mines of the United States. Since the geological formation differs in each mining district and most every mine has local and peculiar rock problems with which to contend, the operator is frequently confronted with the important question of selecting proper machinery and determining the most economical method of rock excavation under conditions existing in his property. As in all other branches of coal mining, the excessive or moderate cost of rock work depends to a great extent upon the judgment of the superintendent, engineer and men directly in charge and the selection of suitable equipment. There are doubtless many properties where a marked reduction in total operating costs might be effected by a careful selection of proper drilling equipment and a close study of methods employed in properties where rock excavation constitutes an operation secondary only to the actual mining of the coal.

The problem of rock excavation in coal mines differs materially from that of metal mining, since in the latter hard rock is generally encountered, whereas in coal mining a relatively soft material is to be mined in which the drilling may be accomplished by hand. Where rock excavation is necessary, it is ofttimes in widely separated parts of the workings, thus requiring a class of apparatus extremely portable, available for operation over a large territory at a minimum cost for installation and maintenance.

Leading Forms of Rock Work in Coal Mines

The nature and extent of rock work depend upon the geological formation of the district, the thickness of the coal seam, the faults encountered and the general plan of operation. Figs. 1, 2, 3, 4 and 5 illustrate various phases of coal mining where the drilling and blasting of hard rock is necessary.

Fig. 1 is a cross-section of a typical anthracite deposit in Pennsylvania where the coal measures are much contorted, demanding many rock tunnels, shafts and openings to insure the economical removal of the coal.

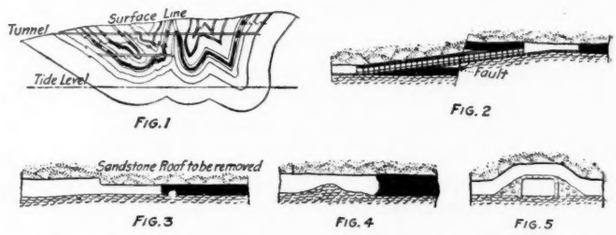
Fig. 2 shows an incline through rock for the purpose of connecting two parallel seams passing through a fault or ventilation tunnel.

Fig. 3 illustrates the rock work necessary in connection with the mining of a narrow bituminous seam. Here the rock work consists in "taking down" hard sandstone roof in entry and haulageways, to admit standard locomotives and other underground equipment.

Fig. 4 exhibits a "horseback," a form of natural rock obstruction found in many mines and a cause of much rock work. Fig. 5 illustrates an overcast, or air course, which is usually excavated in the solid rock of the roof.

Within the past decade the principal coal properties have been either partly or wholly electrified, and electric methods have therefore largely superseded the older and less efficient methods of power distribution for mining operations. Naturally manufacturers have been quick to realize the importance of developing new mining equipment adapted to a motor drive. Since there is a relatively small percentage of coal mines now using compressed air as a medium of power transmission and utilization, the motor-driven rock-drilling machines will be principally considered in this article.

For drilling holes in the softer shales and slate, as well as in coal, the rotary motor-driven coal auger is without doubt the most efficient and satisfactory device obtainable. It is readily portable and may be operated from existing electric-power circuits. It has been in general use for a sufficient length of time to demonstrate that it is highly



FIGS. 1 TO 5. FIVE CONDITIONS UNDER WHICH ROCK WORK IS NECESSARY

practical where the material to be drilled is sufficiently soft to prohibit the use of drills of the percussive type.

For drilling the harder grades of rock the rotary type of auger, which excavates the material by abrasion, is obviously unsuited, and it becomes necessary to employ a machine of the percussive type similar to those used in metal-mining and quarrying operations.

The percussive drilling equipment may be divided into two classes—the motor-driven portable compressor with standard pneumatic rock drills and the direct motor-driven percussive rock drill.

Portable Compressors with Pneumatic Drills

The portable compressor plant is a compromise between the directly motor-driven rock drill and the centrally located compressor plant. The portable outfit is undoubtedly well suited to those properties that have discarded their centrally located compressor plants because of excessive power losses in the air-transmission lines, due to the widely extending range of the underground workings. Properties formerly utilizing air as a medium of power transmission, which have since partly electrified their workings and now use electric energy for haulage and other underground service, have found that the portable compressor will permit them to use the few remaining pneumatic mining tools and drills that have not been wholly superseded by directly motor-driven apparatus.

The portable compressor equipment consists of compressor air receiver and motor, all mounted upon a suitable car or truck. The compressor, operating at medium

*Fort Wayne, Ind.

speed, is usually connected to a motor of comparatively high speed through a train of reducing gears. Suitable starting apparatus for the motor, hose, tools and pneumatic drills proper usually complete the drilling outfit. Portable-compressor manufacturers already have on their lists plants of the following sizes and horsepower:

Piston Displacement, Cu.Ft. per Min.	Air Pressure, Lb.	Brake Horsepower
78	90 — 100	12 — 12.5
145	90 — 100	23 — 24
304	90 — 100	51 — 53

The small sizes are recommended for one or two light-weight rock drills, while the medium and larger sizes of plants will furnish sufficient air for coal punchers, radial cutters and drills. The first cost of a plant of this description ranges from approximately $1,200 for the smaller sizes complete to several thousand dollars for the larger. Cost of power, location of plant underground so as to prevent serious interference with haulage, blasting and other operations, maintenance and attendance are all factors demanding serious consideration in addition to the initial cost.

The direct motor-driven, or so called "electric rock drill," in which the drilling mechanism and motor constitute a light, portable unit of high efficiency, has in the last five years proved so dependable and efficient that many of the larger properties are discarding other classes of drilling equipment and adopting the electric drill as their standard. The electric drill coming into general use operates on the revolving-hammer principle, as illustrated in Fig. 6. The drill steel, which is slowly rotated, receives 1,750 hammer blows per minute. The striking hammers are carried in a heavy revolving element similar to a flywheel. The hammer operates within a steel bushing, or cylinder, and has sufficient travel within this cylinder so that it can rebound immediately after delivering a blow to the projecting cap of the drill steel which is interposed within its path of rotation. The rebound of the hammer from impact with the drill-steel cap is perfectly cushioned upon air that is trapped behind the hammer in the cylinder in which it reciprocates.

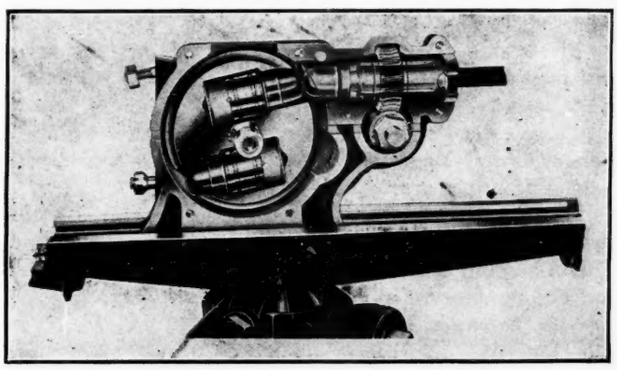


FIG. 6. MOTOR-DRIVEN PERCUSSIVE ROCK DRILL

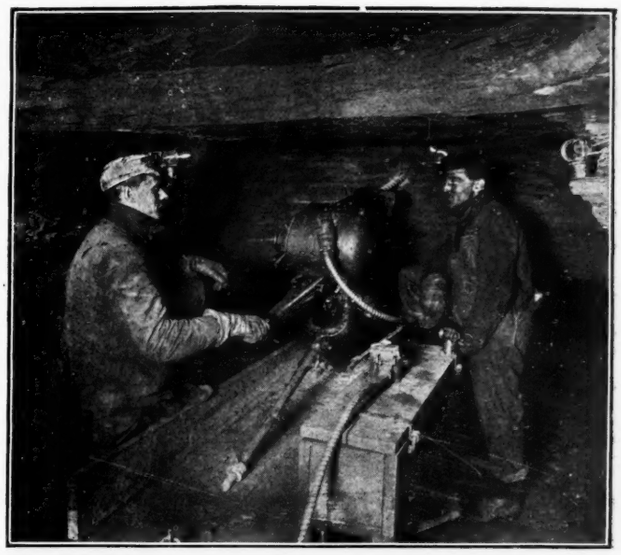


FIG. 7. ELECTRIC ROTARY MOTOR-DRIVEN ROCK DRILL WITH STANDARD TRIPOD MOUNTING

The electric motor is mounted upon the housing containing the striking and rotating members. The motor may be instantly detached, thereby separating the drill into two light-weight, easily handled units. The motors are obtainable for any standard current, and the drills can therefore be operated from any electric line that may be in service throughout the mine.

While operating this drill requires but 1½ hp., yet in sandstone, limestone and the harder materials usually found in coal properties, the machine has attained drilling speeds of 6 to 12 in. per min. The tool is recommended for drilling holes of large diameter and of a depth from 12 to 14 ft.

The electric-drill equipment complete usually consists of the drill with motor, tripod, steel-armored cable connecting plug and drill steel. The connecting cable may be attached to the trolley and rail in any part of the mine

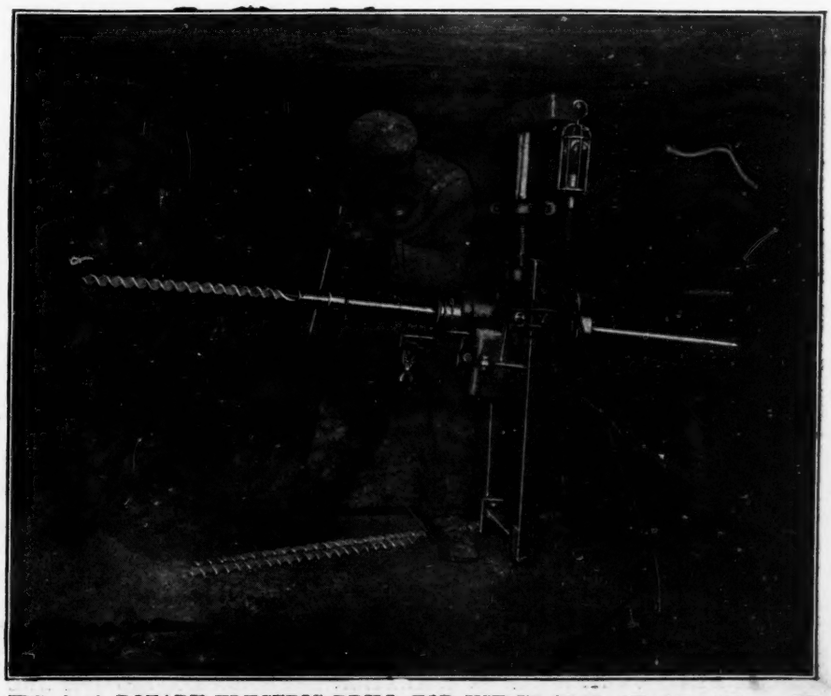


FIG. 8. A ROTARY ELECTRIC DRILL FOR USE IN COAL, SHALE AND SLATE

where the current is available, and is ready for operation immediately.

Ordinarily one man and a helper constitute the drill crew, although several mining companies have developed special mountings suitable to local conditions such as blasting "horsebacks," "brushing roof" and "overcasting," whereby one man accomplishes the necessary drilling. The initial cost of an electric drilling equipment ranges from $775 to $800 complete. The cost of power and upkeep is negligible.

Properties having thin but excellent seams of coal lying between hard sandstone and formerly operated at a loss have reduced this "dead work" expense to a minimum by using drills of this type and are now mining their coal at a profit. Based on the experience of users during the last few years, it is safe to predict that this rotary hammer type of electric drill is the solution of the rock-drilling problems for coal mines and this truly portable electric drilling equipment will doubtless prove the means of profitably reclaiming the thin coal seams so abundant in many districts.

The illustrations to this article are of equipment manufactured by the General Electric Co.

Haulage Economies

In a business with a narrow margin of profit, like that of coal mining, it is a matter of great importance if a few cents per ton can be saved by means of increased economy. While in a large number of mines it is still customary to consider any old method perfectly in place as long as the coal can be got out with a fair degree of regularity, yet there is no use shutting one's eyes to the fact that extreme competition is gradually forcing the adoption of more economical methods all around.

It is safe to assume that some time in the future the majority of mines will be operated as economically and efficiently as are our railroads today. The great handicap has always been the limited life of a mine. This, however, has been vastly overestimated because the period of depreciation of a first-class piece of machinery may not be longer than even part of the life of the average mine. Farsighted operators cannot fail to notice that many a piece of machinery with lowest first cost is dear in the end, figuring its cost with maintenance repairs and breakdowns included.

Great possibilities were foreseen for the application of anti-friction bearings to mine cars, and as soon as a successful mine-car bearing was on the market, mining operators were quick to take advantage of it and commenced to change over their existing equipment.

A thorough investigation of the haulage conditions was started. A special testing car with automatic recording instruments was built. This car was inserted between locomotive and train and a number of tests made. It was discovered that the average drawbar pull on the level was only ⅓ to ½ when flexible roller bearings were used in place of the previous plain bearings.

An example will show what this signifies. A certain mine in Pennsylvania produces an average of 1,000 tons of coal per day and uses 2-ton cars with 18-in.-diameter wheels and a track gage of 40 in. The grades in this mine are in favor of the loaded trains, and a careful analysis of the power consumed by the empty and loaded trains, when running over the main and gathering hauls, shows the following result:

Plain-bearing cars	488 kw.-hr. per day
Flexible roller-bearing cars	254 kw.-hr. per day
Saving	234 kw.-hr. per day

Based upon a charge of 1c. per kw.-hr. the saving in power amounts to $2.34 per day, or $702 per year of 300 days.

At the same mine it was found that the expense of material and labor for lubricating the cars was reduced about $500 per year.

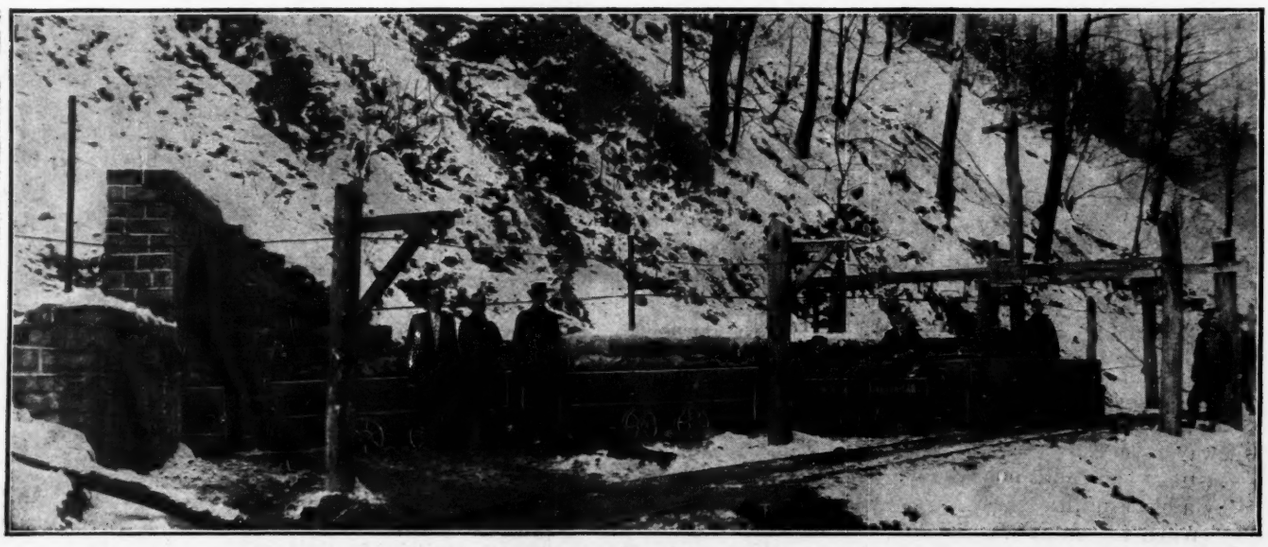
The higher-priced roller-bearing cars required a total annual investment charge of approximately $300 over plain-bearing cars.

The summary is as follows:

Saving in power	$702
Saving in lubrication	500
Total	$1,202
Less investment charge	300
Yearly saving	$902

Or 0.3c. per ton of coal.

The reduction in drawbar pull was followed in every case by an increase in speed. This means that a certain



THE DYNAMOMETER CAR IN OPERATION BETWEEN LOCOMOTIVE AND TRIP OF LOADED COAL CARS AT A PENNSYLVANIA MINE

quantity of coal can be transported quicker, or that a larger quantity of coal can be produced by increasing the length of the trains.

No attempt has been made to estimate the saving made possible by using smaller locomotives, smaller transmission lines, smaller power plant, smaller repair shop, or that resulting from decreased wear and tear on cars and tracks.

If due allowance were made for these various items, it would be found that the total saving resulting from the introduction of roller bearings is in the neighborhood of 0.6c. per ton. Lack of space does not permit us to go into the details of this elaborate process of calculation, but fortunately every mining operator can check this figure based on his own equipment and local conditions.

A Piece of Quick-Paying Equipment

One of the tools for use around a colliery that will pay for itself the quickest in labor saved and breakdowns repaired is an oxyacetylene welding and cutting outfit.

The Locust Mountain Coal Co., of Shenandoah, Penn., some time ago bought an outfit from the Davis-Bournonville Oxy-Acetylene Co., of Jersey City, N. J., consisting of a welding and cutting torch, together with the necessary tips, the oxygen and acetylene reducing valves, hose, etc. The complete equipment cost about $275. In the first week a structural-steel boom on a revolving shovel was welded. If this could not have been repaired, a new boom would have been needed. This saved about $200. In the same week an engine bed on a shovel was welded, which would have cost at least $40. Here in a week was an actual saving of at least $240 to apply against the original cost of the outfit.

As a cutter the machine effects great savings. In two hours one man cut 48 ft. of ½-in. tank steel for the sides of two dippers for the drag bucket of an electric dragline. It would have been almost impossible to make this cut with ordinary tools, as it was full of offsets and curves. To do this without a machine would have taken two men at least 4 days.

In taking old locomotive tires from the wheels, a set can be removed in 5 min. by the cutting torch, by simply cutting through the old tire, when it drops away from the wheel.

In case a cam strap breaks on a locomotive, it is only a matter of 15 or 20 min. to weld the break and have it back on the engine, saving considerable time and an expensive repair part.

Around a breaker a great many uses are found for the oxyacetylene outfit. One large saving in particular was made on a dump carriage. A Whiting dump is employed, and from usage the horns were badly battered where the car runs on the dump, being worn away at least ¾ in. This was hard on cars and dump, as there was a drop where the cars went on and off. In an hour the horns had been built up to their original position, and the dump was as good as new. If the welding apparatus had not been available, the horns would have had to be thrown away in a comparatively short time, as they were steel castings and could not be welded in the ordinary manner by a blacksmith.

When the outfit was bought, a demonstrator from the company instructed a man in its use. This man was then sent to the plant for a week to see how the work was done. At the present time there are three welders and cutters at the mine who are capable of using the outfit.

The cost of operating is small compared with the work done, as only a small supply of welding materials, consisting of iron rods, steel, copper, etc., are necessary. The oxygen is bought in tanks of 200 cu.ft. under a pressure of 1,500 lb. from the Linde Air Products Co. A contract can be made with this firm based on the monthly consumption. The larger the amount consumed the lower the rate per cu.ft. of this gas. The same is true of the acetylene. This is bought from the Commercial Acetylene Railway Light and Signal Co. and on the same basis.

The outfit is easily handled as the tanks weigh only about 170 lb. each and can be carried about anywhere around the colliery by two or three men.

Mine-Equipment Cost

During the winter of 1911-12, I had charge of the construction in northeastern New Mexico of a coal-mining plant, consisting of tipple, power plant and endless-rope-haulage inclined plane. It was a severe winter in that section, and much of the work was done under disadvantageous conditions.

The tipple has 5 loading tracks and is equipped with Jeffrey shaking screens in two sections. The upper section is a double-deck affair carrying the ¾-in. perforated metal slack screen, which is surmounted by a 2½-in. bar screen that carries all the larger sizes of coal over the slack screen onto the lower section. The slack screen has an area of 75 sq.ft. The lower section carries 75 sq.ft. of 1½-in. perforated metal screen through which passes the pea coal and 50 sq.ft. of 3-in. perforated metal screen through which passes the nut coal. Lump is passed over the end of the screen.

The screens are equipped with hinged cover plates so that all sizes can be passed over them and loaded as run-of-mine coal on the lump track. There is also a bin provided under the dumping plate so that run-of-mine can be loaded without running over the screens. All lumber in the tipple structure larger than 2x8 is Oregon fir, the remainder being native pine. The height of the structure from loading tracks to dump is 32 ft. The approach, which is included in the cost, consists of six bents ranging in height from 6 to 30 ft. The size of all main bent timbers is 12x12 in. Foundations for the tipple bents are of concrete. Roofing is No. 26 corrugated iron.

The tipple is equipped with Jeffrey-Griffith cross-over dump and Fairbanks quick-registering beam scales. The costs of the equipment were as follows:

Lumber and roofing	$3,207.53
Scales	160.00
Tipple equipment, including screens, dump and one 30-hp., 2,200-volt motor	2,697.28
Labor	4,021.44
Freight on equipment and lumber	519.55
Total	$10,605.80

There were two sets of track scales installed. One was a 100-ton capacity, 76-ft. platform scale, and the other was a 100-ton capacity scale with 60-ft. platform. Both had type registering beams and were set with concrete pits and foundations. Their costs were as follows:

Cost of one Fairbanks 100-ton track scale, style 26-C, 76 ft. long, and one Fairbanks 100-ton track scale, style 26-C, 60 ft. long	$2,467.50
Cost of concrete contract, 160 cu.yd. at $8	1,260.00
Freight on scales	467.50
Labor (excavation and installation)	1,081.21
Total	$5,276.21

An incline for endless-rope haulage was also installed. This incline was 5,200 ft. long and had an average pitch of 12 deg. There was put in a Stine double-sheave incline machine equipped for running with power. The incline was equipped with a Leschen patent flattened strand wire rope, 6x25, 1¼ in. in diameter. The costs were as follows:

Cost of labor for grading and laying track	$6,004.69
Cost of rail, bolts and spikes, one track 30-lb. and one track 45-lb. steel	3,612.48
Native-pine ties	660.00
Lumber and cement	193.05
Freight on ties and rails	115.46
Machinery:	
One 50-hp., 2,200-volt, 3-phase, 60-cycle, type CCL Westinghouse motor, 850 r.p.m., with auto-starter with no-voltage release	531.40
Incline machine, sheaves and rollers	1,957.68
Rope grips	667.49
Freight	357.58
Labor	619.67
Rope:	
11,700 ft. Hercules PFS wire rope	5,255.65
Freight	328.79
Labor and material for installation of rope	737.93
House for incline machinery, 20x32 ft., of brick construction, 13-in. walls, concrete foundation	1,444.14
Total cost of incline equipped	$22,486.01

An Increase in New York City's Fuel Bill

The coal bill of New York City will show an increase of more than $115,000 this year, based on the consumption of 1914, as the result of the increases in pay granted the mine workers by the anthracite and bituminous-coal operators. This amount does not include the five cents advance in water-freight rates, which, as the city buys its coal delivered at the docks, will no doubt be added to the f.o.b. price. As the coal consumption in 1914 amounted to about 554,500 tons, this item alone will aggregate about $27,000, making the total increase in the neighborhood of $142,000.

The consumption by sizes in the city departments in 1914 was about as follows in tons:

Broken	62,500	Pea	114,000	Buck. No. 3	63,000
Egg	40,500	Buck. No. 1	125,000	Mine-run	115,000
Stove	10,300	Buck. No. 2	22,500	Slack	1,700

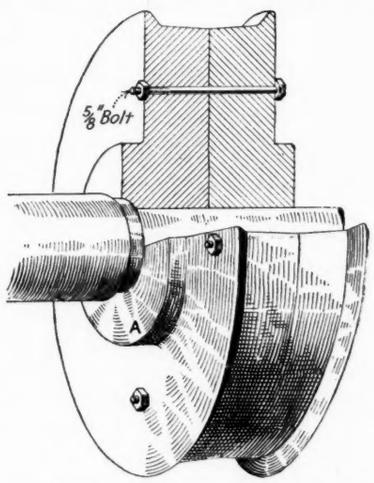
The increases in the domestic sizes of anthracite so far announced are 15c. for egg, 40c. for stove and 50c. for pea. The city does not use any chestnut coal. Boiler coal, which takes the place of buckwheat Nos. 2 and 3, is being quoted at $2.20, or 25c. more than the city paid for the two buckwheat coals at an average price of $1.95. In addition there has been an increase of about 25c. in the price of bituminous coal.

An indication of what the city will be required to pay for its coal can be obtained from the range of prices submitted by thirteen coal firms to the Central Purchasing Committee on May 26, when bids were opened for furnishing and delivering about 32,000 tons of anthracite and bituminous coal during the month of June. The prices submitted showed the following range: Stove coal, $6.50 to $8.12 according to place of delivery; egg, $6.98 to $7.50; pea, $3.83 to $5.58; buckwheat No. 1, $2.97 to $4.73; buckwheat No. 2, $3.49 to $3.68; buckwheat No. 3, $2.27 to $3.52; mine-run, $3.27 to $4.50.

This was the first contract advertised for on competitive bidding since last February, when, on account of the high prices quoted at that time because of the uncertainty of the labor conditions, permission was asked of the Board of Aldermen to buy coal in the open market. Prices submitted in the open market showed the following ranges: Broken, $6.15 to $6.50; egg, $6.45 to $7.25; stove, $5.59 to $7.60; pea, $4.07 to $5.75; buckwheat No. 1, $3.70 to $5.10; buckwheat No. 3, $2.30 to $3.00; mine-run, $3.25 to $3.50.

Old Mine-Car Wheels

Two discarded mine-car wheels placed face to face on a shaft make a good roller for carrying the cable of an inclined hoist. At any mine there are usually several old car wheels on the scrap heap. To take these and make a cable roller is a simple task that any mine blacksmith can accomplish in two hours. The job is a particularly easy one, provided the wheels were loose on the car axle. With most car wheels the hub protrudes beyond the outer rim. Knock this hub off with a sledge and chisel and then place the wheel flat under a drill press and drill four 11/16-in. holes as illustrated. Two wheels having been prepared in this manner, they are placed face to face and bolted together with 5/8-in. bolts and driven on the shaft. Any shaft with a diameter smaller than that of the bearing hole in the wheels will do, as the wheels can be shimmed to fit. This is also true if the bearing within the wheels has been badly worn. The flanges prevent the cable from slipping off, and the chilled bearing surface of the wheels wear well under the cable. Rejected car axles can be used as shafts for the rollers, provided the ends are not so badly worn that they will not give a good bearing in the boxes.—*Engineering and Mining Journal.*



CAR WHEELS BOLTED TOGETHER

Operator's Duty to Promulgate Safety Rules—A coal operator whose business is carried on by a large number of employees and in dangerous ways is under legal obligation to make, publish and enforce reasonable rules to protect the workers from injury through negligence of each other. (Kentucky Court of Appeals, Little vs. Consolidation Coal Co., 184 Southwestern Reporter, 873.)

Buyer's Rights in Agency Transaction—Where a buyer of coal was innocently led to believe that the person with whom he dealt in buying coal was the owner thereof, when he was in fact merely the agent of his father, the buyer was entitled to offset against the amount due for the fuel a debt owing him from the son. (Kansas City Court of Appeals, Beatty vs. Heath, 183 Southwestern Reporter, 1102.)

Operator's Liability Concerning Ways to and from Work—A coal operator is not only bound to use a reasonable degree of care to provide a reasonably safe place of work for his employees, but must also provide a reasonably safe means of ingress and egress to and from the place of work. This rule is applied in a case where a miner was injured while walking down a slope in being struck by empty trip cars. (Arkansas Supreme Court, Charles vs. Central Coal and Coke Co., 183 Southwestern Reporter, 969.)

The Labor Situation

General Labor Review

In the anthracite region the Susquehanna Coal Co. is the most recent victim of the determination of the contract miners to work as short a time as they please. The men at the Pennsylvania colliery of that corporation quit work on June 24 in opposition to the rule that contract miners must work a full day. In all 1,500 men are idle.

The independence of the miner like that of the farmer has acted to impoverish the class. The man on the farm works whenever he will and he frequently does not so will. The fences become crowded with weeds, the buildings decay, golden rod overruns the fields, the farm is not bespread with lime, skivings or manure and the farmer accordingly cannot make both ends meet.

The miner similarly too often falls victim to his own unthrift, and the healthy discipline about to be enforced in the anthracite region in accord with the Pottsville convention's agreement is good for both miner and operator. The earnings of miners show how unequal is the effort that they put forth. Some men send their boys away to college, buy homes and have a bank account, and the others hardly manage to pay for their daily provender out of their earnings.

At the Seneca colliery of the Lehigh Valley Coal Co., the strike to compel all the men to join the union ended on June 19 when the men returned to work. The mine workers were idle only one day, but during that time the men who had not paid their dues surrendered and were reinstated in the union. Outside of these two strikes, both in direct violation of the miners' agreements, there has been but little unrest in the anthracite region.

Miners in Pittsburgh Region Return to Work

The miners of western Pennsylvania district No. 5 are returning to work. It is expected that all will be back in the mines by the first of next week. This comes as the result of a promise from the international executive board that it will appoint a committee to inquire into the situation with a view to procuring an agreement such as the mine workers desire.

It is to be hoped that this committee will be successful, as it is not likely that the mine workers will consent to work under an agreement that is not every bit as liberal as that assured them under the McAlpin contract. Those who have suffered by a change in the manner of computation of wage from a screen to a run-of-mine basis will have to stand whatever loss accrues. There is no redress and the men know it. There should be none, for they voted for the change in the referendum on the McAlpin agreement. The mine workers are willing to abide by this change as they feel they are in duty bound.

They should concede, however, that some clauses providing for a careful preparation of coal be inserted in their contract. Even to include a "snubbing" provision in that agreement would not be unreasonable, as other places have granted it. If its enactment is a breach of the understanding, the violation is perhaps excusable because that contract provision has been conceded elsewhere under similar circumstances. The Pittsburgh operators need the snubbing provision every bit as much as those in the Hocking Valley.

Two Wage Conferences in the State of Ohio

In Ohio the miners at the thin-vein mines of the Hocking Valley district failed to get a contract that would establish a differential between thick and thin coal. The operators declared with truth that the McAlpin agreement did not provide for any differential and that the miners could not secure it even though their coal did not reach a thickness of 5 ft. So the Athens conference, as far as the miners were concerned, came to an untimely end.

The representatives of 3,000 mine workers in the Massillon district at the northwestern edge of the Ohio coal fields met during the last week in an effort to arrive at an agreement on the working conditions to be incorporated in the two-year scale that became effective Apr. 1.

Near Glouster in the Hocking Valley district there is much dissatisfaction among union miners who left the district during the period of idleness and supported themselves at work elsewhere. The union demands of them that they pay $10 for a new union card because they did not pay their dues while they were working.

The men who stayed at the mines paid no dues and received benefits, and the former absentees cannot see why they should be fined as it were for being so considerate of the purse of the union as to go away and support themselves when union funds were being distributed.

Many new men are being taken into the mines as business is now brisk, and the shutting down of the workings in the early part of the year caused many men to leave the district.

Western Kentucky Mine Workers Nonconcur

It will be remembered that in western Kentucky the mine workers and miners agreed that the new wage scale should be unchanged, but they could not agree on the mining conditions. The subscale committee of mine workers and operators came to an agreement with which the scale committee could not bring itself to concur. The mine workers on that committee left the matter to the international executive board, and that body declared that the subscale committee had made an acceptable bargain.

But still there was the referendum of the miners of the district (No. 23) for the contract to face. Here the agreement struck a snag. Reports from all locals but two show 1,185 votes against approving the agreement and 1,032 for approval, or a clear majority of 153 against acceptance.

Only about half the men voted on the agreement. It appears that those who had made contracts with the operators that were more liberal than those proposed, but that were of force only till a general agreement was concluded, felt that they were making sacrifices in accepting the terms of the operators. So quite naturally they voted against the proposition.

Think a Strike Should Have Been Declared

Some of the men who have been members of the United Mine Workers of America for 20 yr. or more feel aggrieved that the international board did not decide against the agreement. They regard its approval as not given on the merits of the case, but out of a desire to avoid the expense of financing a strike. The agreement is as follows:

First—A renewal of present prices and conditions in their entirety with the following exceptions: All men shall work "double" when loading after machines and shall be allowed three rooms. It is agreed, however, that the operator who requires his employees to work double must not take advantage of this privilege by crowding the mine to such an extent that the loaders cannot be given a reasonable turn.

Second—It is granted that the men now employed shall be given the privilege of choosing their partners from the loaders now employed at the mine. It is further agreed that the question of a price to be paid for the operation of the new type of shortwall machine, the question of a system for cleaning coal and the method of paying for dead work that the operators have proposed shall be referred to a joint commission to be composed of two operators to be appointed by the Western Kentucky Coal Operators' Association and two miners to be appointed by the president of district 23. The commission so appointed shall within five days after the resumption of operation begin its investigation and in the event of said commission failing to agree upon any or all of the questions involved within thirty days, it shall be its duty to select an umpire and the decision of said umpire shall be final and binding on all parties to this agreement.

In eastern Kentucky the miners feel that if wages have risen the costs of living have risen even more. It is alleged that the Pioneer Coal Co. has cut the price of yardage on narrow work. This has caused a controversy between the mine workers and the company and the men are idle. The Continental Coal Corporation has adjusted its difficulties in a manner satisfactory to the miners who have accordingly returned to work.

Howat Will Appeal His Case Against Keith

Alexander Howat, the president of the Kansas district No. 14, is not satisfied with the result of his suit. He wants to recover $50,000 damages from the codefendants of Joseph Hazen, and has appealed against the verdict as far as it had reference to Charles S. Keith and the Central Coal and Coke Co. Joseph Hazen's attorneys have also filed an appeal.

The difficulty in Kansas has been adjusted, the miners conceding that the operators who have several mines may close or work at will any or all of them, and do so part or all the time. A successful wage conference may now follow.

Editorials

Increased Use of Equipment

The current number furnishes an illuminating exposition of the rapidly accelerating increase in the use of mechanical equipment in the coal industry. The increase is distributed in all branches, and in the final analysis it indicates that we are after all only fulfilling our destiny as predetermined by the older European countries. Germany, with her lean coal, has been able to make herself an important factor in the world's coal market only by the excellence of her mechanical preparation. Great Britain, though possessing high-quality fuels, has held her preeminent position in the foreign markets largely for the same reason. This, American exporters, attempting to compete with the English fuels, have repeatedly discovered to their chagrin.

The tendency today, therefore, is toward more elaborate mechanical equipment. A determining factor in this connection is the aggressive competition in the industry. Farsighted operators are awakening to a realization of the fact that a thorough preparation of their product to meet the exact requirements of the consumer is one of the chief controlling influences that will assure them a sustained market for their coal.

Up to a decade ago, conservative old-time managers were frankly prejudiced against the installation of much machinery, on the theory that a break in any one link of the chain completely ties up a plant, and the longer the chain the more possibilities of a break. The theory was undoubtedly based upon a sound principle, and would have continued indefinitely had not the consumers become more discerning in the matter of their purchases, to the advantage of progressive operators who offered them a better-prepared product. As a result, the industry is facing the dawn of a new era, in which the experts on preparation will become a dominating figure.

Kingston Coal Co. Militiamen

The Kingston Coal Co. has always pursued a generous and enlightened policy in conducting its mines. The threatened Mexican war, which is already putting the patriotism and solidarity of our people to the acid test, has resulted in many an exhibition of the generosity of corporations. Leading among these is the Kingston Coal Co. The promise it has made to those who have joined the militia runs as follows:

All employees of the Kingston Coal Co. on the timebook thereof, who were members of the National Guard of Pennsylvania on the day of the President's call for mobilization of the militia of the United States, June 19, 1916, and those who have since enlisted up to and including, June 23, 1916, take notice—that during the term of actual service thus called, the Kingston Coal Co. will guarantee:

First—Upon their honorable discharge from said service a return of their old job or one equally remunerative.

Second—During the time of actual honorable service under the above enlistment, said employees will be continued on the payrolls at the same average rate of wage as was actually earned during the past six months, the same to be paid to the nearest of dependent kin as assigned by said employee, less the amount paid to him by the United States Government and subject to the following exception—that in case of single men not living at home said amount shall be less $10, the equivalent of board.

Third—Should any such employee be injured or killed while in the performance of duty and upon certificates from the regimental surgeon, said employee and his dependents will participate in the Workmen's Compensation Fund of the Kingston Coal Co. in like manner as if he were injured while on duty with us, less the amount allowed by the United States Government in such case, including therein a reasonable charge for the privilege of the Soldiers' Home, if such privilege be offered.

THE KINGSTON COAL CO.,
F. E. Zerbey, General Manager.

It is hard to know which is most deserving of praise—the fairness of the plan provided or its generosity. When, however, it is learned that there may be a whole company to be provided for by the Kingston Coal Co. in the manner outlined, the liberality of the agreement stands forward most prominently.

There are few properties so favorably situated or so dexterously managed that such munificence could be exhibited without drawing from capital. But it is likely that the employees of the Kingston Coal Co. that do not enlist will endeavor by diligence in their labors to show what is the patriotic course in time of war and what recognition should be accorded to those who show such magnanimity in their dealings with their employees. It is their part and privilege to aid by their energy to make up for the losses their employers and other like generous concerns will sustain by having a large number of their men on the equivalent of a vacation with full pay.

To the employees of the Kingston Coal Co. that have thus volunteered, congratulations are also due. Even with promise of pay and full compensation, they are surrendering not a little for the benefit of their country—for soldiering in Mexico is grievously hard work and compensation is something we must die or suffer to win and it is an inadequate award for such supreme sacrifices. But there are many men, especially among the miners, to whom such sacrifices are even welcome where the cause is worthy.

There has been much talk about the mine operators being unpatriotic and their employees little better. The Kingston Coal Co. answers the one allegation and the United Mine Workers *Journal,* despite all its misguided talk about the interests, meets the other. It says this week:

We realize that all steps were taken by the Administration at Washington to avert the present contingency . . . . . After the outrageous raid on Columbus by the Villa bandits, there could have been only one policy—to follow these bandits that the Mexican government could not control, wherever they might go. To have done less would have met with condemnation from almost all of the citizens of this country. And yet this program could only result, as now has developed, in bickerings resulting in clashes—clashes that inevitably must bring war. We hope that the final result may be for the welfare of the people of that unhappy country.

The action of the Kingston Coal Co. must meet with universal approval. The company shows clearly, however, as one reads between the lines, that it believes it to be no part of the individual corporation to support its men at the front. So long as the United States Government

shirks its many responsibilities to its citizens, the company which encourages its men to enlist, which engages enlisted men when they present themselves for hire, which uses its men well and builds up in them thereby a patriotic desire to serve their country, which nationalizes its foreigners and which hires men of native birth, puts itself at a disadvantage with companies that pursue an opposite and less worthy course.

The losses of the militiamen should be made good by the public. The load should be distributed over the shoulders of all. But this fact has no immediate significance to the patriotic employer who is competent to meet the burdens of his militiamen. The needs of these men, he feels, are enough for him to consider. Until the United States Government will do its duty, the corporation will sustain the burden, condemning thereby the crabbed souls of men like Senator Gore, who talk glibly about "capitalizing patriotism," as if paying a man his usual salary for fighting and protecting his family by compensation were capitalizing the man's virtue or doing anything more than paying feebly for services received.

Let Gore and his like no longer talk of superior pay accompanying superior hazards till they are willing to see normal pay conceded to men who offer themselves in the supreme hazard. We suggest that the politician hide his foolish head if it can utter nothing better, or the public will once more worship at the shrine of the people who are doing worthy things and will despitefully regard those who are merely hindering those things from being achieved and effected.

Our Close-Walled Industry

An industry apart is the coal-mining industry. What is passing in other lines of human endeavor seems to travel along without much recognition from the coal operator. For example, the steam shovel for years removed earth for a phenomenally low figure and it seemed as if it were going to do this for generations before the coal industry would be reached. It was thought that the burden over the fuel was too great to remove profitably even with a steam shovel where the coal was good; where the coal was not good, it was assumed that the market would not accept it.

But now we know that the burden can be profitably removed to such a depth that good coal can be secured, and we also have learned that weathered coal has a value of its own. So the steam shovel is now generally recognized—at least in North America. As far as *Coal Age* knows, that device is not so valued in England and, though in Germany and Belgium there are some coal and lignite strippings, the overburden is still not removed in those countries with the aid of the dip shovel.

And now the steam shovel, which did not seem to have a field in mining—at least we thought not in earlier years—is taking on what the Darwinians would call a functional variation. Strip-pit work is different from railroad work. There is no problem to be solved in the placing of the shovel. Portability is not nearly so much a question as in the construction of a railroad bed. But the chief variant condition is the fact that with the recovery of thin beds and reasonably light cover the duty of the shovel is not to load cars, but to shift dirt from side to side of a track.

The long boom comes into use and the size of the bucket is less restricted, for there are no cars or wagons to fill, and therefore no considerations of such equipment need concern the contractor. Again the work is permanent, and the shovel can be fitted to its task. There is no question, as in railroad contracting, as to the fitness of the shovel to perform some dozen future jobs, some large, some small, when the present one is finished.

Thus the steam shovel designed for the railroad, functioned to aid in railroad construction, is now finding some of its most notable developments in the coal field, where a few years ago it was almost unknown. It has broken down the Chinese wall and discovered the coal-mining business.

There are many other manufactured articles that, just like the steam shovel, might pass in far larger quantity through the great wall of separation into the domain of coal if the manufacturers only knew the field and could understand the conditions and the jargon of the business. Among these might be mentioned steel reinforcement, sewer pipe, boiler stokers, power-coal measuring and weighing devices, coal conveyors and superheaters. Manufacturers might better interest themselves in the coal industry than study, as so many of them are now doing, the bulletins of the Bureau of the American Republics and the treatises of the National City Bank on South American trade. For the coal field is a large and open market and may be made a source of great profit, but it can be entered only by those who are boldly determined to make a breach in its fortifications and force their way into it.

The engineers in it read their own organs, attend their own institutes, visit one another's operations and are so conservative that what has not the earmarks of use in the coal field or some recognition from the confraternity has at least but a cold welcome.

In these days when our manufacturers are sighing to do business in the Spanish language and ship to tropic ports, how about the prospects of a large trade in the United States and Canada where the welcome will be generous and the need for adaptation to alien needs even less than when dealing along the Caribbean and beyond? To the manufacturer of the United States it might be suggested that in industry at least he "see America first."

The Coastwise Market

A slight easing off in ocean freights is already causing an even better inquiry for export, but bottoms along the coast are in as short supply as ever. Quotations are now fairly firm on the $2.85 basis, but as yet there is no detention worth mentioning, coal coming down from the mines in about the volume required to clear ships promptly. Steamers to New England are making their regular trips, and more favorable weather means that tows are moving more satisfactorily.

At the same time, stocks in that territory are low and nearly every shipper is behind on his contract obligations. Some of the factors who were relying wholly upon steamers are filling in with barges where they can be found. It calls for quite a barge tonnage, however, to take the place of one steamer. There is less hopefulness, too, on the subject of steamers from off the Lakes, for it is found that many are either not at all suitable for coastwise trade or they are in such shape that it will be several months before they can be placed in commission in the ocean service.

Discussion by Readers

Coöperation Among Illinois Coal Operators

Supplementing your optimistic editorial, which appeared under the caption "Coöperation Among Illinois Coal Operators," *Coal Age,* June 17, p. 1058, permit me to offer some reasons why there is urgent need for the coöperation among the operating interests that you predict coming.

Under the new wage agreement a mine outputting 4,000 tons of mine-run coal per day and operating 200 days in the year cannot produce this coal for less than 90c. per ton, more probably 92 to 95c. This being the case, what should be the cost of producing a ton of mine-run coal at a mine operating two or three, or even six days a week, and producing 600 to 2,000 tons of coal?

Assuming the cost to be 90c., the mine-run ton would be divided about as follows: 37 per cent. 6-in. lump, 37 per cent. egg and nut, 26 per cent. screenings. As lump, egg and screenings have been selling at 80c., it is obvious any way you figure, that there is a loss of 10 to 15c. per ton.

Again, we might assume the mine-run ton to be divided into the most natural marketable coal—2-in. lump and screenings. If 70 per cent. of the lump is sold at 95c., we have 66½c. for the lump proportion, and if we can average 60c. for our screenings (which figure has not been reached in this market for the past five years), we would receive 30 per cent. of 60c., or 18c., for the proportion of 2-in. screenings in a ton of mine-run coal. The sum of the two, 66½c. plus 18c., gives 84½c. for one ton of mine-run coal. But you can buy lump coal, 2-in. to 6-in. at from 80 to 85c., and all of the screenings you want at 75c.

Instead of conducting investigations into the proposed coöperation among the operating interests here, it is to be hoped that the United States Government, either through the Department of Justice or the Trades Commission, will take measures to restrain the incompetents that have produced this result. Certainly they are causing mine after mine to be abandoned and sold for debts or placed in the receiver's hands for the creditors.

St. Louis, Mo. SALES AGENCY.

Effect of Fall of Barometer on Emission of Gas

Letter No. 5—I was interested in the inquiry of "Fireboss," *Coal Age,* Mar. 25, p. 550, asking for the effect produced by a fall of barometer on the emission of gases occluded in the coal and other strata. The answer given to this inquiry on the same page is correct though brief.

It is generally understood that gas may be held mechanically imprisoned in the minute pores of the coal, or it may be dissolved within the coal, which is the general technical meaning ascribed to the term "occlusion." Still a third hypothesis assumes that the gas in coal is the result of a continuous generating process. These several conditions are explained on pages 16 and 17 of Bulletin 26 of the Federal Bureau of Mines, by R. T. Chamberlin.

Exhaustive experiments by the Bureau of Mines have proved conclusively that the emission of gas from coal is not appreciably affected by any possible barometric changes. Crushed coal placed in sealed glass bottles from which the air was exhausted showed no appreciable increase in the rate of emission of gas from the coal. This being true of coal confined several months in a vacuum proves conclusively that the comparatively slight change in barometric pressure can have no appreciable effect on the emission of gas from coal in the mine.

Emission Differs from Flow of Feeder Gas

As has been explained in *Coal Age,* Apr. 15, p. 685, there is a wide difference between the emission of gas from the pores of coal and the flow of gas from feeders or blowers. In the latter case the gas flows out from crevices, which may form a system of fissures or zones of fracture, in which the gas has accumulated and remains confined until released by the work of extraction going on in the mine. The effect of barometric changes is undoubtedly more marked in the flow of gas from feeders, particularly if the gas so stored is under moderate pressure. Observation has shown that strong gas blowers emanating from reservoirs lying deep in the formation are less affected by barometric changes.

As has been already explained, *Coal Age,* Jan. 15, p. 136, in reply to a similar inquiry, the greatest danger, however, lies in the outflow of gas accumulated in old entries and rooms that have been abandoned and not properly ventilated. Such accumulations of gas are readily affected by barometric changes, a sudden fall of barometer being accompanied by a considerable outflow of gas into the live workings, which if not well ventilated, at once become dangerous. For this reason the entrance to such abandoned areas should be carefully watched at all times, as specified in the mining laws of many states.

Madrid, N. M. J. W. POWELL.

To Stop Heavy Flow of Water in a Borehole

Letter No. 2—The inquiry of J. H., in regard to stopping a heavy flow of water in a borehole, *Coal Age,* May 13, p. 858, calls to mind a similar instance in my own experience that may prove of interest.

In the mine where I was working at the time, the coal was shot off the solid, the miners firing their own shots before going home for the night. It happened that a shot fired one evening by a miner broke into an old borehole, the existence of which was not known to the officials of the company. The shot liberated a large amount of water and considerable gas but did not break down enough coal to expose the borehole to view.

Inasmuch as there were known to be abandoned workings in that vicinity it was naturally supposed that the

water and gas came from that source. The quantity of water flowing from the hole can be best appreciated by the fact that a 25-hp. electric pump, having a 4-in. discharge, was unable to handle the water coming from the hole, which gained steadily on the pump.

A closer investigation revealed the fact that the water was coming from the borehole which was discovered in the roof. The pressure of the water and the gas was found to be so great that it was impossible to drive a plug into the hole to stop the flow. This was finally accomplished, however, in the following manner:

A plug was made to fit the hole and spiked to a good piece of 2x4 rail, about 10 or 12 ft. long. The end of the rail was then rested on a fulcrum formed by a post stood just beyond the hole, and the plug being inserted into the hole was forced upward by applying sufficient force to the other end of the rail, which served as a lever. It was held in this position until a good post was set under the plug and driven up. Finally, having cut off the 2x4 rail on each side of the plug, a concrete pillar 3 ft. in diameter was built so as to wholly incase the timber and plug. No further trouble was experienced by the flow of water or gas from this borehole into the mine. U. S. WILSON.

Briceville, Tenn.

Detecting Gas by Smell

Letter No. 8—I want to confirm the statement made by J. A. Greaves in his inquiry, *Coal Age,* May 6, p. 815, to the effect that it is often possible to detect the presence of marsh gas or firedamp in the mine by the sense of smell, before making the test with the safety lamp to observe the orthodox flame cap.

Several years ago when employed as deputy, which position in the old country corresponds to that of mine examiner in Illinois or fireboss in many states, it was a common experience when going into a heading and approaching the working face, for me to quickly detect the presence of gas by reason of its somewhat rank smell.

I quite agree, however, with the statement made by many correspondents in this connection that pure marsh gas is both tasteless and odorless. In the mines to which I have referred, the smell of the gas was due to the presence of a small percentage of hydrogen sulphide (H_2S). This mine was 540 yd. deep and very fiery. I recall one instance where a fall had occurred on a horse road, leaving a cavity high in the roof. On this road it was possible to smell the gas 6 or 8 ft. away from the cavity. The gas came from a slip in the roof, which had caused the fall.

Showing how narrow-minded we may become in our ideas because of a limited experience, a mine examiner in Illinois to whom I mentioned the fact ridiculed the idea as being impossible. The man had never smelled gas in his life, which is sufficient justification, perhaps, for his believing that my statements were false.

The method of removing gas accumulated in the roof, or on falls, is the same here as in the old country. A "hurdle" or "jumper sheet," being a canvas or curtain erected for the purpose, compels the air to pass upward and sweep away the gas accumulated above. The effect of inhaling the mixture of gas to which I have referred was to induce an excessive headache and dizziness. As the temperature was generally high, there was commonly experienced a lassitude of feeling that inclined one to doze. This was a common experience when brushing gas from a pocket in the roof or face of a heading. T. D.

West Frankfort, Ill.

Letter No. 9—I have followed the discussion of the question of detecting gas by smell with keen interest. The writer of Letter No. 1, *Coal Age,* May 27, p. 938, says: "In that way we kept track of the amount of gas coming from the place. . . . . We could tell how strong the gas was and about how much the place was making." In my opinion that is getting this method of testing for gas down to a pretty fine point.

We have always been taught that marsh gas (CH_4) is odorless, and I have found it so when produced in the classroom by heating a mixture of sodium acetate ($C_2H_4O_2$) and quicklime (CaO). The quicklime prevents the fusion of the sodium acetate. This reaction is expressed as follows:

$$C_2H_4O_2 + CaO = CH_4 + CaCO_3$$

It is a well-known fact that marsh gas is never found pure in the mine, but is usually mixed with other gases, such as carbon dioxide, nitrogen, and frequently hydrogen sulphide, together with traces of other hydrocarbon gases. It is the presence of these other gases that gives the odor or smell so commonly attributed to marsh gas and makes it seem possible to detect the presence of that gas, at times, without the aid of a safety lamp.

However, in my own experience, I have been able to find the gas with the lamp, after detecting its presence by the smell in one entry, but on passing into another entry I have been unable to find the gas with the lamp although the same odor was present. Again, I have found the gas present with the lamp when there was no smell. For this reason I do not regard the nasal organs as providing a reliable test for firedamp. In my opinion no dependence whatever should be placed on such a test. W. H.

Clinton, Ind.

Letter No. 10—In regard to the question of detecting gas by smell and without the aid of a safety lamp, I believe that marsh gas or light carbureted hydrogen (CH_4) is, as we have been taught, colorless, odorless and tasteless.

In my experience, however, it is possible to smell gas that has accumulated in rise places in the mine or in cavities of the roof that are hard to ventilate, when everything is quiet and there is no movement of men or cars that would disturb the gas. When the mine has been idle for a short time, the gas in such places becomes so strong that one can easily detect its presence by raising his head into the place where it has accumulated. The sensation, as nearly as I can explain, is that which one feels when making a quick change from a cool to a warm atmosphere. I do not think, however, that it is well to depend on such a test and believe that the safety lamp should always be used when looking for gas.

The sensation I have just described was frequently experienced in the mines in northwest Durham, England. It was quite different, however, in the mines of southeast Durham, where I was employed as master shifter about seven years ago. These two districts were only about 20 mi. apart. In southeast Durham the gas had a strong smell that would be better described as a stink, resembling that of rotten eggs. The smell was undoubtedly due to the presence of hydrogen sulphide (H_2S) given off with

the marsh gas. The firebosses (deputies) in these mines were wont to describe the condition in their district as "rotten," which was quite correct when the gas was strong. In northwest Durham the firebosses would describe a like condition of gas in their districts as "warm" and generally ascribed it to atmospheric changes due to a fall of the barometer.

On one occasion I asked W. J. Charlton, his Majesty's inspector of mines for the county of Durham, how it was that the gas in southeast Durham had such a strong smell, while his teaching was that methane or marsh gas had no smell. He replied that the smell in the mine was due to the presence of other gases, probably hydrogen sulphide.

When examining for gas, I have never been satisfied to report finding it unless it showed on the safety lamp, which I always regarded as the safest way of testing for gas when the mine was in operation, and I want to urge that this is the only safe method to adopt.

Linton, Ind. W. H. Luxton.

The Efficient Fireboss

Letter No. 16—The many letters that have already appeared have treated this subject so ably that I despair of saying anything new. There are, however, several features in the daily routine work of a fireboss that I desire to emphasize.

Let me suggest, in the first place: Firebossing calls forth all the qualities that go to make a successful man. The efficiency of a fireboss depends, however, not alone on his possessing all these qualities, but to an even greater extent on the degree that he has practiced and developed them.

Eight Essential Qualities of a Fireboss

Following are eight essential things that I believe should be uppermost in every efficient fireboss' mind when performing his daily duties. I acknowledge there may be others of equal importance, and those I am about to mention can doubtless be enlarged upon to advantage. These eight essentials are as follows: 1. Consider first the safety of the men in your charge. 2. See that these men work in a safe and efficient manner. 3. Endeavor to instruct them in such a way as to fit each worker for something better. 4. Study to know your district thoroughly and keep the mind and every faculty alert to detect the first intimation of danger. 5. See that your orders are promptly obeyed and discipline men for disobedience. 6. Give each man a square deal and consider carefully every complaint. 7. Coöperate with your foreman. 8. Be true to yourself and to your company while, at the same time, striving to realize your highest ideals.

The fireboss has the lives of at least half a hundred men and generally more in his keeping. In order to protect them as fully as possible, he should not leave the mine until these men have all gone home in safety. But to do this would often require the fireboss to work long hours, which would not be justice without suitable remuneration for overtime. Or he might be relieved of a portion of his work by an assistant or safety inspector, who would report to him and thus make it possible to reduce the time of the fireboss to 8 hr. in common with other mine workers.

An efficient fireboss will follow up closely the work performed by the men in his charge. Praise for work well done will act as an incentive to better and more efficient work, while poor work should be faithfully criticized and the man instructed privately how to do better. The fireboss who is not able in this manner to fit his men for better and more efficient work may make a good boss in some respects, but will seldom rise above his present position, as the results will not prove his efficiency.

In his daily rounds an efficient fireboss will make himself thoroughly acquainted with the conditions throughout his district. He will examine closely all abandoned areas with a view to detecting the first signs of existing danger. He will often gain the knowledge of his territory that will enable him to make valuable suggestions in regard to its future development.

Discipline Important in Firebossing

Discipline is an important feature in the work of a fireboss. I want to emphasize the point that an efficient fireboss will see that his orders are promptly obeyed. At the same time he will treat his men with firm kindness. When occasion requires, an efficient fireboss will decide quickly the course to pursue to remedy a trouble and avoid danger. He will never stand idle and allow things to take their own course, hoping to escape a possible danger. Men naturally come to trust the judgment and seek the advice of such a one, while they fail to show the same respect and confidence toward a fireboss who never acts on his own decisions but prefers to consult the foreman before doing what lies in the line of his own duties. The foreman may be two miles away in another part of the mine, telling Barney O'Neill not to use too much powder in a hole drilled in the face of a gangway.

The "square deal" is a characteristic of every efficient fireboss. He will listen patiently to the complaints of his men and strive earnestly to better their conditions. In doing this, he is working in harmony and coöperating with his foreman, to whom he makes a daily report. Without such coöperation only poor results are obtained. An efficient fireboss will work constantly as though his bitterest enemy was watching everything done, while at the same time he will be striving to realize his highest ideals.

Joliett, Penn. Forney L. Parker.

Letter No. 17—Permit me, as an old miner, to make a few brief comments in reply to the letter of Edward H. Coxe, *Coal Age*, May 20, p. 895. My attention was drawn particularly to two statements made in that letter—one in respect to the comparative hazard of firebossing and the other relating to the fireboss being generally underpaid.

Referring to the first item mentioned, Mr. Coxe says, "I do not regard his [fireboss] job as being as hazardous as that of a miner, machine runner, driver or motorman." It has already been shown that the fireboss must leave his bed at 3 o'clock in the morning and be underground ready to commence his examination by 4 o'clock, since he must enter and examine every working place in his section of the mine in the three hours previous to the men starting to work.

In making this first examination in the morning, perhaps he has covered 8 mi. of rough traveling, which would be considered quite enough for most men. On his second inspection, however, he must spend 4 hr. climbing falls and traveling under roof that is ready to drop. At the

completion of his shift the fireboss may have traveled 15 or 16 mi., during all of which time he has been exposed to the numerous dangers scattered throughout the mine.

Now compare this condition with that under which the miner works day after day. His work is done in a narrow strip 20 ft. wide at the face of his room, and if he goes outside of this it is at his own pleasure and option. The miner has every opportunity to know the condition of the roof under which he mines and loads his coal, and if he uses proper precaution, he is able to keep himself practically safe in this small area. When comparing the conditions under which these two men work, few will agree with Mr. Coxe that the dangers of firebossing are no greater than those surrounding other mine workers. His statement would seem to show that either the conditions where he was employed as fireboss were very favorable, or Mr. Coxe has not served in that capacity any great length of time.

Basis of Rating a Fireboss' Pay

In regard to the second item mentioned, Mr. Coxe expresses the opinion that firebosses are not generally underpaid, while he admits that they receive a lower wage than mine foremen and assistant mine foremen and make less money than some miners and machine runners. He seems to overlook the fact that the fireboss, if efficient, has in most cases gone through the mill himself, mining and cutting coal, laying track, timbering, driving—in fact, filling almost every position in the mine. He may even hold a mine foreman's certificate in addition to his fireboss certificate, for both of which he has studied diligently to fit himself for the higher positions in coal mining. In most cases the fireboss could relieve either the miner or machine runner, while it would seldom happen that one of these men could relieve a fireboss, should occasion arise.

If a man's knowledge is made the basis for the wages he receives, I would say the value of the fireboss has truly been underestimated. There is no question but that the miner, machine runner and others work hard for the money they receive; but in addition to his hard work, the fireboss must possess a knowledge and experience that have taken much effort and time to acquire, and this knowledge and experience should be taken into account in estimating the value of his work.

Finally, in an indirect way, the fireboss acts as chief adviser on many occasions and becomes responsible for much, the credit for which goes largely to others. In my opinion the fireboss should be hired and paid by the state and act, as has been suggested, under the direction of the state mine inspector and be made responsible to him for all conditions in the mine relating to the safety of the men.

An Old Miner.

——, W. Va.

Letter No. 18—Speaking of the efficient fireboss, I believe few operators really realize the responsibilities that rest on the fireboss and which he must carry to be truly efficient. I never did think that the fireboss received the full credit for the work that he performs. It does not seem that he is given the chance to show what he can do in making the mine safe. In many cases the fireboss holds a mine foreman's certificate as well as his own fireboss certificate and is fully capable of doing many things but seldom gets the opportunity.

On the fireboss rests the responsibility for the safety of the mine and the lives of every man working underground. In many cases the mine foreman gets around the mine once in three or four days, while the fireboss must visit every working place in his section two or three times every 24 hr. Most firebosses do not grumble at this, but frequently feel discouraged because they are given no opportunity to work out their own plans. The mine foreman might often say to a fireboss, "Well, Jack, I believe you can take care of that all right if I send two or three men with you to help you." Such talk would make a fireboss feel that he was somebody and he would work hand in hand with the foreman, which would go far toward decreasing the number of mine accidents.

An efficient fireboss should be a sober man, attend to his work, have good eyes and hearing, and never allow himself to miss a place where there may be gas. When a mine foreman has that sort of a fireboss, it will pay him to give him every opportunity and he need not fear that some day he will take his place from him.

Bicknell, Ind. Fireboss.

Locating a Booster Fan

Letter No. 7—In connection with the inquiry of P. J. Doolan, *Coal Age,* Mar. 25, p. 550, allow me to say that I believe a booster fan can be installed in this mine in a position where it will greatly assist the ventilation of the workings. While I am not an advocate of the use of booster fans in general mining practice, I am convinced by actual experience that they can be used with great benefit in remote sections of large mines where the circulation has become sluggish by reason of extended aircourses and leaky stoppings, doors and overcasts.

In this connection and in support of my conclusion, allow me to refer to a former discussion of booster fans by readers of *Coal Age.* In Vol. 1, p. 1151, R. J. Pickett describes the installation of a 6-ft. booster fan in Mine No. 25 of the Consolidated Indiana Coal Co. The mine was ventilated by a 12-ft. Crawford-McCrimmon fan running at 115 r.p.m. The booster was located in the mine 1,000 ft. from the foot of the downcast shaft and was geared to a mining-machine motor and run at a speed of 350 r.p.m., though when first installed, its speed was 550 r.p.m., which gave too much air and consumed an unnecessary amount of current. The installation of the booster, Mr. Pickett states, increased the quantity of air in that aircourse threefold.

Again, in Vol. 2, p. 300, will be found a detailed account of four tests that I made while mine manager of the Columbia Coal and Coke Co.'s mines at Coalmont, B. C., Canada. The test proved that the installation of a booster fan at a point 2,150 ft. from the mouth of the tunnel where the main fan was located increased the volume of air in the inside workings nearly two-thirds and gave good satisfaction.

Referring again to Mr. Doolan's inquiry and accepting the circulation there shown, I would place the booster fan just outby of the last crosscut in the main return airway. My reason for this location is that experience convinces me that it is always at the farthest point inby where the air current is most deficient and sluggish. The booster fan located at this point, by increasing the depression on its intake inside and the compression on its discharge face, would increase the volume of air in circulation at this point in the mine.

J. W. Powell.

Madrid, N. M.

Inquiries of General Interest

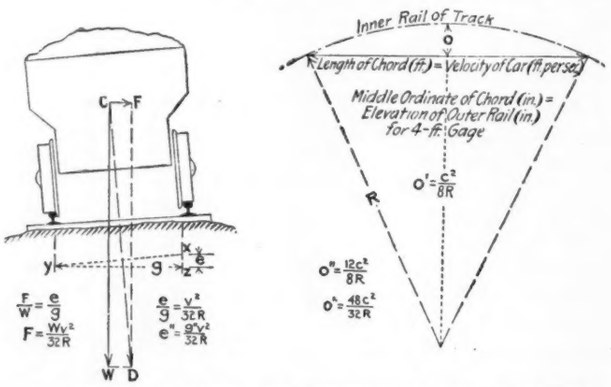
Elevation of Outer Rail of Curve in Track

Will you kindly show me the rule for calculating what elevation should be given to the outer rail in a mine-track curve and explain how it is obtained? What I desire is a rule that I can apply practically to curves of different radii and to different speeds of hauling on any track gage. MINING ENGINEER.

Belleville, Ill.

The ideal condition on which all rules are based in track haulage is to make the elevation of the outer rail of a curved track such that the resultant of the weight of a loaded car, acting vertically through its center of gravity, and the centrifugal force generated by this load moving in a circle whose radius is the radius of the center line of the track, shall be perpendicular to the roadbed or plane of the track ties in their elevated position.

For example, referring to the left-hand diagram in the accompanying figure, let C represent the center of gravity of the loaded car, CW its weight acting vertically through the center of gravity, CF the centrifugal force acting horizontally and CD the resultant of the weight of the load and its centrifugal force. In the diagram let the horizontal line yz represent the gage of the track, and draw the line yx parallel to the inclined trackbed. Then the elevation e of the outer rail for any track gage g is indicated by the line xz. As stated, the ideal condition is realized when the line CD is perpendicular to the line yx. The angle DCW is then equal to the angle xyz.



DIAGRAMS ILLUSTRATING MINE TRACK CURVES

Now since CF is the centrifugal force F, and CW the weight W of the load, we have from geometry,

$$\frac{F}{W} = \frac{e}{g} \tag{1}$$

Again, from mechanics we have for the centrifugal force generated,

$$F = \frac{Wv^2}{32R} \tag{2}$$

in which v equals the velocity of the car in feet per second and R the radius of the center line of the curve, while the constant 32 is the approximate value of the force of gravity. Then, combining equations 1 and 2, and solving with respect to e, remembering that if the elevation e is given in inches, the track gage g must also be expressed in inches, we have, for the elevation of the outer rail,

$$e'' = \frac{g''v^2}{32R} \tag{3}$$

It so happens that the formula expressing very approximately the middle ordinate o of a chord c for any radius R has a form exactly similar to that of equation 3; thus,

$$o' = \frac{c^2}{8R} \tag{4}$$

This formula is based on the geometrical principle that makes the half-chord a mean proportional between its middle ordinate and the diameter of the circle less the middle ordinate. In this case, however, the ordinate is so small as compared to twice the radius of the curve, that we may write $\left(\frac{c}{2}\right)^2 = 2Ro$; and, solving this equation for o, gives for the middle ordinate o'' expressed in inches,

$$o'' = \frac{12c^2}{8R} \tag{5}$$

Then, multiplying both numerator and denominator of this fraction by 4, in order to complete the similarity of the expression with that in equation 3, we have

$$o'' = \frac{48c^2}{32R} \tag{6}$$

Finally, comparing equations 3 and 6, it is clear that the middle ordinate o, expressed in inches, is equal to the elevation e of the outer rail of the track, also expressed in inches, when the length of the chord c, expressed in feet, is equal to the velocity v of the car, expressed in feet per second, the radius R of the curve being expressed in feet. The elevation thus found is for a track gage of 48 in. and the elevation for any other gage is proportional to the gage.

Hence, in order to realize the ideal condition previously described, the rule is as follows: Elevate the outer rail of the track an amount equal to the middle ordinate of a chord whose length in feet is equal to the velocity of the car in feet per second, for a 4-ft. gage. For any other gage of track make the elevation proportionate to the gage. For example, the elevation of rail for a 60-ft. radius curve, when hauling at a speed of 7 mi. per hr. or, say 10 ft. per sec., over a 36-in. track gage, is by formula 3,

$$e'' = \frac{g''v^2}{32R} = \frac{36 \times 10^2}{32 \times 60} = 1\tfrac{7}{8}\ in.$$

Again, by formula 6, the middle ordinate of a 10-ft. chord for a radius of 60 ft., is

$$o'' = \frac{48c^2}{32R} = \frac{48 \times 10^2}{32 \times 60} = 2\tfrac{1}{2}\ in.$$

And therefore, for a 36-in. gage the elevation of the outer rail would be $36/48 \times 2.5 = 1\frac{7}{8}$ in., as previously determined.

Examination Questions

Pennsylvania Anthracite Mine Foremen's Examination, Shamokin, June 6, 7, 1916

(Selected Questions)

Ques.—What dangers are probable in a mine after an explosion of firedamp, and what precautions should be taken upon entering it?

Ans.—The chief danger is that of being overcome by the afterdamp following an explosion in mine workings. It is unsafe to enter a place where an explosion has occurred before ventilation is restored, unless the person is equipped with an efficient type of breathing apparatus that will enable him to penetrate an atmosphere of poisonous gases. Without this equipment one must proceed with caution, examining the air for gas with a safety lamp and proceeding slowly, while constantly observing the effect of the mine air on some caged mice or birds carried for that purpose. Every effort must be made to restore the circulation of air in the place as quickly as possible.

Ques.—Describe fully your method of examining a mine for firedamp, beginning with your preparation before entering the mine, and explain each step taken until the examination is completed and a report made to the proper officials.

Ans.—Before entering the mine, one should examine carefully his safety lamp to see that it is properly put together, filled and trimmed and in good condition. Observe that the ventilating apparatus is working properly and the fan running at its usual speed. After entering the mine, proceed at once to the foot of the downcast shaft or intake, and note that the usual quantity of air is passing into the mine. As far as practicable, follow the air current on its course through the mine to the district to be examined.

Having reached this point, proceed to examine each working place in the district in order, following the air current and seeing that it sweeps the working face in each room. Examine carefully all void places where gas may accumulate. Note the condition of the roof in all passageways and working places. Mark the date of the examination on the coal face in each working place. In this manner proceed throughout the entire section of the mine. The law requires that the examination shall be made "within 3 hr. at most, before time for commencing work." On returning to the shaft bottom when the examination is complete, the fireboss must enter a report of his examination, in a book kept for that purpose, and date and sign the same. Having done this, he must report to the mine foreman that the section of the mine of which he has charge has been examined and found to be safe for work. If gas or other dangers are found, it is the duty of the fireboss to place a suitable danger signal at all entrances to such places, so that no person may enter the same unwarned. He must report all dangers found to the mine foreman, whose duty it shall be to attend at once to their removal.

Ques.—What quantity of air is passing through an airway 7 ft. 4 in. high, 11 ft. 9 in. wide, when the velocity is 434 ft. per min.?

Ans.—The sectional area of this airway is $7\frac{1}{3}$x$11\frac{3}{4}$ = 86.17 sq.ft. Then, assuming that the air current has an average velocity of 434 ft. per min., the volume of air passing is 86.17x434 = say 37,400 cu.ft. per min.

Ques.—In a mine employing 420 persons, how many splits of air does the law require and how much air is required for this number of persons?

Ans.—The anthracite mine law of Pennsylvania requires that not more than 75 persons shall work on a single split of air. To comply with this law, 420 persons will require at least six splits of the air current, since five splits of air would be sufficient for only 5x75 = 375 persons.

The anthracite mine law also requires a minimum quantity of air of 200 cu.ft. per min. for each and every person employed in the mine, which makes the quantity required in this case 200x420 = 84,000 cu.ft. per min.

Ques.—In a mine ventilated by a single current, what would be the effect of splitting the air into several separate currents? Explain how this can be done, and state why such a result is obtained.

Ans.—By dividing the air current passing into a mine into two or more separate currents, the total sectional area, or area of passage, is increased. But for the same power on the air, the velocity varies inversely as the cube root of the rubbing surface and is independent of the sectional area, as shown by the formula, $u = ksv^3$. Assuming the air is divided at or near the entrance of the mine, the splitting of the current does not change the total rubbing surface in the splits and the velocity of the air is constant for a constant power. Hence, under these conditions, the velocity being constant, the volume of air in circulation will be increased in proportion to the number of splits, since $Q = av$. If, however, the air is divided at a considerable distance inby from the entrance to the mine, the total quantity in circulation will be increased, but in a less proportion, since in this case the total air volume must pass through the main airway before reaching the point of split, and as a result the power on the air at this point is not the same before and after splitting.

Splitting an air current in a mine is accomplished by providing two or more passageways by which the air can flow through the mine to a point where it reaches the main return airway or is discharged into the atmosphere. The air current will divide between the several passageways thus provided, in the inverse ratio of their resisting powers. This is termed the natural division of the air current in a mine. When a proportionate division of air is required, this can be accomplished by means of regulators placed in one or more of the airways, which have the effect of increasing the resisting power of those airways and decreasing the quantity of air passing through them.

Coal and Coke News

Washington, D. C.

A resolution calling upon the Federal Trade Commission to investigate the causes of the advance in the price of anthracite coal has been passed by the Senate. The resolution was offered by Senator Hitchcock and was passed by a unanimous vote. The investigation into this subject has already been promised the public by the Department of Justice. Some time ago the Department made public some correspondence between the Attorney General and the Federal Trade Commission on the subject.

In this correspondence the Attorney General called the attention of the Commission to the fact that the coal operators have in the past advanced the price of coal in a proportion greater than each wage advance. This advance in price was excused by the operators by reason of an increase in wages which they had been compelled to pay. The Attorney General told the Federal Trade Commission that a similar thing may follow the recent wage agreement by which the miners will receive increased wages. The Commission promised to keep close watch of the situation and to take proper steps should an unwarranted advance in the price of coal result.

The resolution adopted by the Senate calls upon the Commission to complete its work in this regard and report its findings to the Senate. It reads as follows:

Resolved, That the Federal Trade Commission be, and it is hereby, requested to make an immediate investigation into the operations and accounts of the leading companies producing anthracite coal for the purpose of ascertaining the facts concerning the recent increase in the price of anthracite coal, and report the same to the Senate during the present session of Congress, if possible.

Resolved, That the Commission be requested to include in its report a showing of the relation between the cost of labor and the price of anthracite coal prior to said increase and at the present time.

HARRISBURG, PENN.

One of the most radical steps yet taken by any corporation in the State of Pennsylvania, as far as can be learned, in insuring full remuneration to the men who are called to serve in defense of the nation, is that of the Kingston Coal Co., operating anthracite mines in Luzerne County, which in a statement issued June 23, announces that all employees who were members of the state militia at the time the mobilization order went into effect, or who have since joined the colors, will not only get full pay during their term of service, should they be called, but in the event of injury or death will receive, through their dependents, the full measure of compensation provided under the Workmen's Compensation Act as though they were injured or killed while on duty with the company.

It is not known how many men this will affect, but it is estimated by the coal company officials that there is at least a full company of Kingston Coal Co. employees enlisted in the 9th and 13th Pennsylvania regiments. The order also promises a return of the old job, or one equally remunerative, upon honorable discharge from service.

The order says:

All employees of the Kingston Coal Co. on the time book thereof, who were members of the National Guard of Pennsylvania on the day of the President's call for mobilization of the militia of the United States, on June 19, 1916, and those who have since enlisted up to and including today, June 23, 1916, take notice: That during the term of actual service thus called, the Kingston Coal Co. will guarantee:

First—Upon their honorable discharge from said service a return of their old jobs or work equally remunerative.

Second—During the time of actual honorable service under the above enlistment, said employees will be continued on the pay rolls at the same average rate of wage as was actually earned during the past six months, the same to be paid to the nearest of dependent kin as assigned by said employee less the amount paid to him by the United States government and subject to the following exception—that in case of single men not living at home said amount shall be less $10, the equivalent of board.

Third—Should any such employee be injured or killed while in the performance of duty and upon certificates from the regimental surgeon, said employee and his dependents will participate in the Workmen's Compensation Fund of the Kingston Coal Co. in like manner, as if he were injured while on duty with us, less the amount allowed by the United States Government in such case, including therein a reasonable charge for the privilege of the Soldiers Home, if such privilege be offered.

An Important Controversy

Coal operators from the Pittsburgh, Westmoreland, Clearfield and Connellsville districts, began a rate fight at the capitol before the Public Service Commission recently, that is regarded as the opening gun in the now pending struggle to consolidate the bituminous holdings in the state.

The present hearing has been brought about by the Pittsburgh Coal Operators' Association, which seeks to obtain a reduction of 15c. a ton upon coal shipped to tidewater, over the Pennsylvania R.R. Shortly after the complaint was made the railroad company asked the operators in the Westmoreland and Clearfield fields to intervene as parties at interest. It is now alleged, however, by Clearfield operators that the Pennsylvania as a result of pressure brought to bear by large banking interests in Pittsburgh, is inclined to throw the burden of justifying the present rates upon them.

Operators outside of the Pittsburgh district, especially those in the Clearfield region, allege that they will be crowded to the wall if the Pittsburgh coal operators should be given the benefit of the rate requested. In many respects the coal from the Pittsburgh district is superior to that mined in the Clearfield district, which is now able to compete by reason of the differential it enjoys.

Back of the present controversy lies the fact that as a result of recent developments the great steel corporations are planning to manufacture coke near their plants in modern byproduct ovens. If such a move is made coal and not coke will be shipped from the Connellsville region and a new factor introduced into the present comparative situation.

The Clearfield district operators allege that if they are crowded to the wall the coal-coke interests will control the bituminous coal situation in this state. On the other hand, the Pittsburgh and Connellsville operators contend that if they are not given rate concessions that this state must decline as a bituminous coal field and West Virginia, Kentucky and Virginia operators will reap the benefit.

Moreover, the Pittsburgh coal men make much of the fact that if their contentions are realized they will be able to do all the things with a coke oven that the Germans do and that besides the benefits received from coke oven byproducts they may ultimately make it possible to bring coke into competition with anthracite coal.

Frank J. Large, coal traffic manager for the Pennsylvania R.R. told the commission on June 23, that the days of the Connellsville belt as a coke producing region have about passed; that the beehive coke oven is fast becoming a memory, and that Connellsville operators must get into the coal shipping game or go out of business. Mr. Large, also said that the leading industrial plants of the country were now being equipped with modern byproduct coke ovens; that the United States is in a position to make its own benzol, turn out its own dyes and reach out after the coke business in Mexico and South America that Germany has always monopolized. When peace is restored south of the Rio Grande, he maintained, it will be American coke turned out at American plants that will be used to smelt Mexican ore.

Witnesses for the Pennsylvania R.R. testified that the road is confronted with the problem of securing for itself the Connellsville trade, and is considering proposing a rate adjustment that may make it necessary to redraw the coal map of the state. It was declared that under present conditions the operators might not be able to ship their coal to Bethlehem, Buffalo, Coatesville, Midvale, Sparrows Point and Lebanon plants, to be converted into coke and byproducts. That would mean a loss of tonnage of 20,000,000 a year to the line. Therefore, a readjustment in rates might become a measure of self-protection.

PENNSYLVANIA

Anthracite

Plymouth—A few weeks ago a large portion of the retaining wall fronting Kingston Coal Co., playgrounds, together with considerable of the sidewalk and streetway fell into an old working of Gaylord Colliery, and on June 21, a slight depression took place in the same locality, which caused additional sidewalks to almost drop out of sight and a goodly portion of the dirt under some new pavement with it. Water and gas mains were broken and the street was roped off. The coal company whose workings caused the settlement

placed a force of men at work at once filling it in with timber, rock and whatever materials were handy and best suited.

East Plymouth—Breaking of the ropes in the shaft of No. 5 colliery of the Delaware & Hudson Co. on June 23 resulted in damages that necessitated closing down the colliery for awhile. One carriage dropped to the bottom of the shaft when the ropes snapped, the dogs failing to hold. The other lodged half way down. Buntons and guards in both compartments were damaged by the falling cages. There were no men on the cages at the time of the accident, coal being hoisted from the Red Ash vein. So severe was the breaking of the ropes that the engine was badly damaged, and the engineer, in leaping back from his position received slight injuries.

McAdoo—Settling in the Lehigh & Wilkes-Barre Coal Co. workings under the borough, has affected many houses in the West End so that many doors and windows cannot be opened.

Girardville—The strike at the William Penn colliery, which kept 1,500 men and boys idle for three weeks, was settled on June 22. The colliery has resumed operations.

Hazleton—The miners in the Derringer mine of the Lehigh Valley Coal Co. to the number of 500 who struck against the method of loading required, have at the request of the union officials returned to work, pending an adjustment of their grievances.

Shenandoah—Even though the anthracite trade is not particularly active at this season, yet the collieries in this vicinity were recently compelled to shut down on account of the lack of cars, putting 7,000 men out of work.

Bituminous

Connellsville—The order for mobilization of the national guard has resulted in a continuance of the legal proceedings to decide whether the receivership of the Indian Head Coal and Mining Co. was legal. Lieutenant John Robinson, was counsel for those attacking the receivership. In order that he might respond to the call to arms the case was continued until "after the war".

Johnstown—It was stated recently, that practically all the houses of the Cambria Steel Co. which were for sale, have either been disposed of or there are negotiations pending for their sale, which are expected to be closed in a short time. A few houses remain in Franklin borough, where several of the company's coal mines are located, and there are a few at other mining towns, but of the great blocks of property formerly held by the company and developed with company capital, almost nothing remains now in the hands of the steel company's real estate department.

Uniontown—The H. C. Frick Coke Co., has announced that all employees who are members of the National Guard will receive full pay while in the service of the Government.

Indiana—The officials of the Saltsburg Coal Mining Co., which has a large coal mining plant here, have offered a reward of $1,000 for information which will result in the arrest and conviction of the persons who recently fired a volley of shots at a miners' boarding house and seriously injured one man. A strike recently closed down the mine and a number of the miners were evicted from their homes. The coal company is said to be in possession of proof that the shots were fired by strikers.

Gallatin—The miners at Gallatin, Sunnyside and Manown recently returned to work, about 1,000 men being employed in the three mines. The Coal Bluff and Houston Run mines also started, and it is believed that most of the mines in this district will be operating within a short time.

Irwin—The war spirit is abroad among the English-speaking coal miners in this region, and many foreigners are anxious to take up arms. Michael Petak, a leader among the men recently reported that he could raise at least three companies at Herminie and Madison, and one each at Edna, Ritton, Westmoreland City, and Export. The men are chiefly Italians, Russians and Slavs.

Kaylor—Many persons were left homeless and seven blocks of houses destroyed in a fire at this place recently. Just how the fire started is unknown. The buildings destroyed were the property of the North Penn Coal Co.

WEST VIRGINIA

Page—The railroad tipple and coal bins of the Loup Creek Collieries Co. were recently destroyed by fire originating from a spark from a locomotive. The loss amounts to several thousand dollars, most of which is covered by insurance.

Morgantown—More coal is passing through here than ever before in the history of the state, averaging about 350 cars per day. This coal is shipped from the Fairmont field, and is going to the Pittsburgh district, the demand being caused by the western Pennsylvania strike.

Charleston—Many of the operating coal companies in West Virginia are taking steps to aid their employees who are members of the National Guard, and have been called to the Government service. The United States Coal and Coke Co. is carrying its National Guard employees upon the regular payroll. The Kelly's Creek Colliery Co., and the Kelly Creek & Northwestern Railroad Co. will permit the wives and families of National Guardsmen who have been called to the border to live in the houses of the company, rent free. The men, in all cases, being granted leave of absence, with the assurance that their wives and children will be housed while they are away. The soldiers' families are also requested to apply to the offices of the company for such assistance as may be required during the absence of the head of the household.

KENTUCKY

Lexington—Clyde L. Miller, of Louisa, Ky., has been named receiver for the Eastern Kentucky Coal Co., of Torchlight, Ky., the appointment having been made at West Liberty, Ky., by Circuit Judge Cisco on motion of the Pittsburgh Trust Co. Liabilities are listed at $254,000, no schedule of assets having been made available here. The order resulted on failure of the company to pay interest on first bonded indebtedness.

Barbourville—Coal operators in the Bush Creek district recently won an important decision in a case which has been before the Interstate Commerce Commission for two years, when that body ordered freight reductions. These involve lowering of the freight rate differential from 10c. and 12½c. per ton to 5 and 7½c. This field is served by the Cumberland R.R. on which the new rates become effective August 21 and will allow this district to compete in many markets. Reparation of alleged overcharges was refused.

OHIO

Wellston—The strike of about 250 men at Mine No. 11 of the Superior Colliery Co., at Wellston, was short-lived. After several conferences between U. S. Morris, president of the company and J. M. Roan, head of the Ohio Operators Compensation and Labor Bureau with the miners' representatives it was decided to return to work. The agreement provides for no increase in removing "bug dust" from the mine.

Columbus—The George M. Jones Coal Co. of Toledo, which has taken over the 12 mines of the Continental Coal Co., located in the Hocking Valley district is operating seven of the mines and the remainder will be placed in operation as soon as the necessary repairs are made. Modern machinery has been installed and the output of the seven mines has now reached 3,700 tons daily. A large proportion of this production is being shipped to the head of the Lakes.

San Toy—The Sunday Creek Coal Co. will open its two mines at San Toy about July 1. These mines, together with all others in Ohio have been idle for almost a year. A modern mining town has been built by the company at San Toy with new houses and sanitary arrangements. Other mines of the company will be placed in commission later.

Coshocton—Only one mining district in Ohio is without its mining scale adjusted and this is the Coshocton field. A meeting of operators and miners has been called to meet at Coshocton soon for the purpose of adjusting the scale and working conditions in accordance with the McAlpine agreement. The scales and working conditions have been settled in the Crooksville, the Massillon and the Bergholtz districts without serious difficulty.

Glouster—A mining machine in Mine 256 recently broke into the old No. 10 workings, with the result that a portion of No. 256 was flooded. More than 100 men will be idle while this water is being pumped out. No serious difficulty is, however, anticipated in the dewatering of this operation.

ILLINOIS

Springfield—Operators of the Springfield district are planning to install mining machines this fall. The question was taken up at a conference of representatives of the Central Illinois Coal Operators' Association and a sub-scale committee of miners at the offices of the Springfield Coal Mining Co. The miners object to the machines on the ground that the result will be the employment of fewer men. An effort is being made to arrive at an adjustment that will inflict no hardship on the miners. Another conference will be held later.

Lincoln—The Latham Coal and Mining Co. has closed a contract with the Jones & Adams Coal Co., of Springfield for the latter company to handle the entire output of the Latham mine, which is located on the Chicago & Alton and the Illi-

nois Central railroads here. The Latham mine will be put into operation about July 1. The Jones & Adams company will open an office here, which will be in charge of Harold D. Wright as sales agent. He has been for several years with the Latham company. The capacity of the mine is 1,500 tons a day.

Carlinville—Four prosecutions have been begun here against the Superior Coal Co., which operates large mines at Benld and Gillespie charging violations of the Illinois law which requires coal operators to provide washrooms for their employees at convenient places near the mines. The law was passed in 1913. It has not yet been construed by the courts of last resort. The Superior company takes the position that the law is oppressive and unconstitutional. The company employs between 2,500 and 3,000 men and the furnishing of wash room facilities, together with lockers, which the law also requires, would be expensive. The law contemplates that the wash rooms and lockers shall be subject to the supervision of county mine inspectors and other officials. Operators and miners are interested in the outcome of the test cases which have been begun by the State's Attorney.

PERSONALS

M. M. Nolan, superintendent of the Brush Creek Coal Co., recently changed his address from Homer City, Penn., to Patton, Penn.

H. S. Rodgers was recently elected assistant secretary and treasurer of both the Maryland Coal Co. and the West Virginia & Maryland Coal Co.

John H. Jones, president of the Pittsburgh-Buffalo Coal Co., recently announced the marriage of his daughter, Johnetta, to J. L. Grimm, Jr., in the City of Pittsburgh.

Cecil W. Proctor was recently appointed general sales agent of the Coaldale Mining Co., of New York. Mr. Proctor has for many years been connected with the Skeele Coal Co. as Eastern sales manager.

Edward H. Coxe recently removed from Knoxville, Tenn., to Pittsburgh, Penn., where he is connected with the United Coal Corporation, which, on July 1, will take over the properties of the United Coal Co. and subsidiary companies, and the properties of the Jenner-Quemahoning Coal Co.

Thomas Kennedy, president of District No. 7, United Mine Workers, has been appointed by Governor Brumbaugh of Pennsylvania, as a trustee of the State Hospital at Hazleton to succeed Hugh B. Conahan, deceased. James E. Roderick, Chief of the Department of Mines, is president of the board.

W. J. Richards, president of the Philadelphia & Reading Coal and Iron Co., was recently appointed on the Naval Advisory Board of the nation. Mr. Richards will represent the mining engineering profession for Schulykill, Carbon, Northumberland, Columbia and Montour Counties of Pennsylvania.

W. D. McKinney, commissioner of the Southern Ohio Coal Exchange has invited J. F. Callbreth, secretary of the American Mining Congress to appear before the members at a near date for the purpose of lecturing. Mr. Callbreth is scheduled to speak before the eastern Ohio operators at Cleveland July 10.

William K. Kavanaugh, president of the Southern Coal, Coke and Mining Co., has offered to the City of St. Louis his country home, Kennett Castle, 40 mi. below the city on the Mississippi River, as a municipal farm for delinquents. The estate consists of 4,500 acres. City officials will investigate the feasibility of the proposition.

H. A. Hodson, secretary of the Inner Group Coal Trade News and Efficiency Bureau, St. Louis, Mo., has gone to the mobilization camp at Nevada, Mo., with the First Regiment, National Guard of Missouri, of which he is a member. His duties are being looked after temporarily by John Dintelman of the Lenz Coal and Mining Co., Arcade Building, East St. Louis.

OBITUARY

William J. Glennon, 60 years of age, for many years a mine foreman for the Erie Coal Co., died recently from the bursting of a blood vessel while he was mowing the lawn in front of his home in Carbondale, Penn.

Thomas Waddell, aged 65 years, once a prominent independent coal operator of the Wyoming Valley, died on June 22 at Bedford, Ohio, a suburb of Cleveland. Mr. Waddell was a native of Pittston, Penn., and a son of Thomas Waddell, who came to the anthracite field from Scotland in the early days of the coal industry and was prominent in the development of the local field. About 15 years ago Mr. Waddell removed to Ohio, where he had large iron foundries. The Waddell family was also identified with the lead and zinc mining in the Missouri field.

RECENT COAL AND COKE PATENTS

Coal Washing Jig. C. A. Wendell, Joilet, Ill. 14,121 Apr. 25, 1916. Filed Feb. 21, 1916. Serial No. 79,768.

Coke Oven. A. E. Peters, Westmont, Penn. 1,183,401, May 16, 1916. Filed Sept. 10, 1913. Serial No. 789,052.

Fuel Economizer. W. E. Frost, Auburn, Me. 1,172,128, Feb. 15, 1916. Filed Feb. 4, 1916. Serial No. 6,120.

Coal Washer. W. M. Tipper, Carbon Hill, Ala. 1,184,049, May 23, 1916. Filed Jan. 24, 1916. Serial No. 73,928.

Mining Car Wheel. A. B. Day, Knoxville, Tenn. 62,178, Feb. 29, 1916. Filed Nov. 18, 1915. Serial No. 823,285.

Boiler Tube Cleaner. J. C. Bowman, Roy, Utah. 1,180,230 Apr. 18, 1916. Filed Aug. 16, 1915. Serial No. 45,671.

Mining Machine. F. D. Buffum, Boswell, Penn. 1,182,453, May 9, 1916. Filed Jan. 11, 1910. Serial No. 537,462.

Damper for Boilers. C. D. Young, Altoona, Penn. 1,172,000, Feb. 15, 1916. Filed Jan. 16, 1915. Serial No. 2,542.

Locomotive Stoker. A. R. Ayres,, Chicago, Ill. 1,181,560, May 2, 1916. Filed May 26, 1913. Serial No. 769,840.

Dumping Car. C. Dunning, New Orleans, La. 1,180,382. Apr. 25, 1916. Filed Sept. 20, 1915. Serial No. 51,655.

Mining Machine. F. Cartlidge, Terre Haute, Ind. 1,173,170, Feb. 29, 1916. Filed Oct. 24, 1913. Serial No. 196,410.

Boiler Brace Coupling. S. V. Walck, Lansford, Penn. 1,183,-701, May 16, 1916. Filed Nov. 20, 1915. Serial No. 62,537.

Miner's Safety Lamp. S. Starcevich, Ronald, Wash. 1,181,-042 Apr. 25, 1916. Filed Nov. 21, 1914. Serial No. 873,363.

Coupling for Mining Cars. E. S. Earls, Danville, Ill. 1,173,-494, Feb. 29, 1916. Filed Apr. 24, 1914. Serial No. 834,107.

Mine Check Holder. W. A. Williams, Barton, Ohio. 1,182,-953, May 16, 1916. Filed Apr. 20, 1914. Serial No. 833,188.

Coke Oven Door. J. A. McCreary, Connellsville, Penn. 1,-170,650, Feb. 8, 1916. Filed Dec. 11, 1914. Serial No. 876,071.

Cleaning Device for Flues R. G. Finlay, Cleveland, Ohio. 1,180,331 Apr. 25, 1916. Filed Apr. 10, 1914. Serial No. 830,855.

Mine Car Wheel and Bearing. J. J. Roby, Cleveland, Ohio. 1,173,218, Feb. 29, 1916. Filed Mar. 9, 1914. Serial No. 823,285.

Hand Mining Machine. N. Pedulla, Macdonaldton, Penn, 1,184,205, May 23, 1916. Filed Sept. 24, 1915. Serial No. 52,-388.

Boiler Flue Cleaner. A. R. Urie and F. P. Uhrig, La Center, Wash. 1,180,960 Apr. 25, 1916. Filed May 13, 1915. Serial No. 27,848.

Engine for Coal Boring Machines. J. W. Evans, Denver, Col. 1,181,126, May 2, 1916. Filed Dec. 5, 1914. Serial No. 875,587.

Electric Lamp for Miners. W. Hickmann, Greisheim, Germany. 1,174,146, Mar. 7, 1916. Filed July 17, 1911. Serial No. 638,985.

Miner's Safety Lamp. T. E. Suffolk and J. Piggford, Elizabeth, Penn. 1,180,203 Apr. 18, 1916. Filed Mar. 20, 1915. Serial No. 15,921.

Mechanism for Operating Coal Augers. T. W. Davis, Honoker, Va. 1,183,441, May 16, 1916. Filed Nov. 23, 1915. Serial No. 63,031.

Furnace Door Construction. C. W. Watkins, Dorranceton, Penn. 1,183,702, May 16, 1916. Filed Jan. 28, 1916. Serial No. 74,800.

Coal Feeding and Burning Apparatus. W. G. Wilson, Elizabeth, N. J. 1,179,488 Apr. 18, 1916. Filed Apr. 29, 1914. Serial No. 835,086.

Coking and Gas Generating Oven. W. Feichs, Bloomfield, N. J. 1,171,418, Feb. 15, 1916. Filed Jan. 22, 1912. Serial No. 672,771.

Emergency Escapeway for Mines. J. Hoskins, French Gulch, Calif. 1,179,630 Apr. 18, 1916. Filed June 1, 1915. Serial No. 31,615.

Mining Machine. H. A. Kuhn and W. W. Macfarren, Pittsburgh, Penn. 1,184,358, May 23, 1916. Filed Mar. 27, 1909. Serial No. 486,148.

Safety Apparatus for Mine Hoists. D. F. Lepley, Connellsville, Penn. 1,183,306, May 16, 1916. Filed Sept. 28, 1914. Serial No. 863,972.

Stoking Device for Pulverous Fuel. K. H. von Porat, Stocksund, Sweden. 1,179,784 Apr. 18, 1916. Filed May 31, 1913. Serial No. 770,988.

Apparatus for Removing Boiler Scale. G. E. Sandblom, Gottenborg, Sweden. 1.181,616, May 2, 1916. Filed Oct. 29, 1915. Serial No. 58,649.

Tilting Side Dump Car. C. H. Clark assignor to Clark Car Co., Pittsburgh, Penn. 1,182,643, May 9, 1916. Filed July 30, 1913. Serial No. 781,986.

Mining Machine Moving and Holding Device. E. C. Morgan, Morgan Park, Ill. 1,183,102, May 16, 1916. Filed June 27, 1910. Serial No. 569,170.

Chain Grate Stoker. W. P. Reiboldt, Newark, N. J., and E. C. Clark, Nutley, N. J. 1,173,307, Feb. 29, 1916. Filed Sept. 20, 1911. Serial No. 650,459.

Mining Machine and Truck. N. D. Levin, assignor to Jeffrey Mfg. Co., Columbus, Ohio. 1,170,763, Feb. 8, 1916. Filed Apr. 25, 1910. Serial No. 557,432.

Gas Producer. W. B. Chapman, assignor to Chapman Engineering Co. New York, N. Y. 1,182,640, May 9, 1916. Filed Feb. 13, 1912. Serial No. 677,339.

Means for Feeding Coal to Boiler Furnaces. C. B. Newcomb, Grand Rapids, Mich. 1,181,338, May 2, 1916. Filed Mar. 28, 1914. Serial No. 828,101.

Smoke Consuming Furnace. O. D. Orvis, assignor to United Furnace Corporation, New York, N. Y. 1,170,989, Feb. 8, 1916. Filed Sept. 16, 1913. Serial No. 790,141.

Mine Car Wheel. W. V. Johnson asignor to American Car and Foundry Co., New York, N. Y. 1,183,984, May 23, 1916. Filed Nov. 22, 1915. Serial No. 62,877.

Roller Bearing Mine Car Wheel. W. J. McDonald, assignor to American Car and Foundry Co., New York. 1,183,994, May 23, 1916. Filed Dec. 1, 1915. Serial No. 64,514.

Process for Making Non-Coking Coals Coking. J. Becker, assignor to H. Koppers Co., Pittsburgh, Penn. 1,182,738, May 9, 1916. Filed Dec. 8, 1913. Serial No. 805,369.

Mine Car. W. V. Johnson and J. L. McDowell assignors to American Car and Foundry Co., New York, N. Y. 1,183,982, May 23, 1916. Filed Aug. 5, 1915. Serial No. 43,794.

Mine Lamp. W. McK. White and E. C. Brommer assignors to Electric Service Supplies Co., Philadelphia, Penn. 1,183,147, May 16, 1916. Filed July 6, 1915. Serial No. 38,054.

INDUSTRIAL NEWS

Pittsburgh, Penn.—The movement of coal and coke over the Pennsylvania Railroad Co.'s lines, east of Pittsburgh and Erie, in May was 6,112,581 tons, or an increase of 874,077 tons. The increase for the five months of the present year was 6,432,899 tons.

Harrisburg, Penn.—A committee was recently appointed by the Pennsylvania State Retail Coal Merchants' Association to take up with the operators the questions involved in resizing the grades of coal. Opposition to the abolition of the grade known as pea coal was voiced.

Columbus, Ohio—The Jeffrey Mfg. Co. recently opened a branch office in Dallas, Texas, in the Commonwealth National Bank Bldg., which will be in charge of J. U. Jones. This firm also opened an office in the Railway Exchange Bldg., St. Louis, Mo., with W. V. Cullen, in charge.

Mansfield, Ohio—Beginning July 1, the Ohio Brass Co. will act as general sales agent in the United States for the entire line of Crouse-Hinds, Imperial headlights for mine and railway use. This line contains a complete assortment of luminous and carbon arc, as well as incandescent headlights.

Norfolk, Va.—Three million ninety-four thousand two hundred and eight tons of bituminous coal was carried by the Norfolk & Western Ry. during the month of May. This established a new record in the transportation of this product. The previous record, 3,027,236 tons, was made during October of last year.

Scranton, Penn.—Because of the caving in of the surface over the workings of the Peoples Coal Co. recently 20 dwelling houses were badly damaged, as was also the No. 16 public school, one of the finest in the city. The school house was rebuilt about six years ago following extensive damage from the same cause.

Owosso, Mich.—The properties of the New Haven Coal Mining Co., at Owosso, were recently sold under the sheriff's hammer for $175. This action was taken to satisfy a judgment against the company for $1,172 awarded by the Circuit Court. Approximately $100,000 had been expended on this property in development work.

Detroit, Mich.—The Diamond Power Specialty Co., recently accepted a contract from the Ford Motor Co. for equipping the boilers of the new power plant with Diamond soot blowers. These are believed to be the largest boilers in the world, having a rated capacity of 2,400 hp. each. They will regularly be operated at 4,000 hp. each.

St. Louis, Mo.—Railroad earnings in the St. Louis Federal Reserve District continue to show increase, according to William McC. Martin, Reserve Agent of the Federal Reserve Bank at St. Louis. While the volume of freight tonnage remains at a high level, it is being handled more expeditiously and the railroads are better supplied with cars than a few weeks ago.

St. Louis, Mo.—The Kolb Coal Co. has been awarded the contract for supplying the fuel requirements of the Terminal Railway Association and the Wiggins Ferry Co. for the year beginning July 1. The needs of the two companies are about 400,000 tons of egg and screenings, which will be supplied from the Mascoutah mines. The Breeze-Trenton Coal Co. had the contract last year and sublet part of it to the Kolb company.

Boston, Mass.—In consequence of strikes now on at the Camden, N. J., plant of the New York Shipbuilding Co., the construction of seven large coal-carrying steamers for local owners will be seriously delayed. Five of these colliers are for the Darrow-Mann Co. and one each for the Coastwise Transportation Co. and the Pocahontas Fuel Co. The steamers being constructed for the Darrow-Mann Co. include the largest coal carriers ever built on the coast, one having a capacity of 12,000 tons, two 9,000 tons, and the other two 8,000 tons each.

St. Louis, Mo.—The new agreement between the Illinois operators and mine workers contains a clause which is intended to break up the practice of mine superintendents selling jobs to miners, and the practice of mining companies favoring in the distribution of employment men who purchase building lots. There has been a good deal of complaint about such practices. A few months ago there was an investigation and one man was arrested on the charge of violating the state labor law by giving jobs to men who bought lots. In the new agreement the operators promise to coöperate with the miners in stamping out such methods.

Washington, D. C.—The eastern coal-carrying railroads testifying before the Interstate Commerce Commission against a further reduction of rates to lake ports, stated that the reduction of four years ago from 88 to 78c. a ton had cost them $6,000,000. The case is before the commission on the request of the Pittsburgh Coal Operators' Association asking that the rate be still further reduced to 66c. per ton, and the railroads claim that this will mean an additional loss per year to them of $4,000,000. The commission will take further testimony in the case at Atlantic City on July 11. At the same time and place it will also hear the appeal of the Appalachian coal roads asking for an increase of 15c. per ton in the rates to central freight association points.

Washington, D. C.—A large and important hearing in the so-called Lake cargo coal rate case has been scheduled by the Interstate Commerce Commission to be held in Atlantic City, N. J., on July 13. This is the case which involves the general investigation into the reasonableness per se of the coal rates from Pennsylvania, West Virginia and Ohio fields to the ports of the Great Lakes for shipment beyond by water, and the proportion such rates should bear to each other from the various fields. The Commission has combined in the general case the complaint of the Pittsburgh Coal Operators Association against the Pennsylvania Co. and other railroads. The Commission recently granted authority to various coal companies to intervene in the proceedings.

Columbus, Ohio—Reductions in coal rates on the Hocking Valley and Toledo & Ohio Central railroads from the Hocking district were ordered recently by the public utilities commission as the result of a complaint brought almost a year ago by the Sixth Ohio district of United Mine Workers of America against all the 46 steam railroads in the state. The complaint was pressed only against the two roads affected by the commissioner's order. The mine workers complained that present rates were discriminatory in favor of West Virginia and Kentucky coal. The cuts ordered by the utilities commission on the Hocking Valley are as follows: From Nelsonville to Lovell and intermediate points, no reduction; from Nelsonville to points between Lovell and Fostoria, from 80c. per ton to 78c.; from Nelsonville to points between Fostoria and Toledo, from 85c. to 80c.

Market Department

General Review

Anthracite circulars holding very steady for the midsummer period. Complete adjustment Pittsburgh labor controversy causes mild reaction in bituminous. Exports on the increase.. Lake movement heavy and Middle West less active though still good.

Anthracite—There has been surprisingly little cutting of the circular for this season of the year, the short production and improvement in transportation facilities in certain directions, increasing the absorptive power of the market, and tending to stiffen the situation up at a critical time. No better evidence of the excellent tone is needed than the fact that most of the hard coalers continue working at the full capacity of the labor and car supply. Some cutting of the circular under special conditions is still noted, and an unexpected feature of this is the fact that some of the old line companies, heretofore noted for their rigid adherence to base prices are the leaders in this move. The consuming interests are showing a marked disposition to withhold orders for the customary storage supplies, due to higher prices, and it is not unlikely that the trade will slow down notably over the ensuing two months. There is some delay in issuing the new July circulars, and it is likely that a few of these may be omitted, though such omissions will not indicate that companies will not expect to realize the increase.

Bituminous—The final adjustment of the Pittsburgh labor difficulty has closed that market to outside coal and caused a mild reactionary tendency, though this is compensated for largely by a deficiency which has been steadily developing in the Lake shipments. The price recessions have not been of important proportions and the demand continues fairly heavy. With the exception of the railroads, some of which are placing orders for surplus tonnages, there is an almost total absence of any general storing, such as might be expected, and indications are strong for an active market this fall. The declining freight rates are having a very stimulating effect on export business and agencies interested in this trade are confident of a record-breaking business ahead of them. The movement over the Hampton Roads piers, after showing a very sharp decline the week before last, has again attained to closely approaching record proportions.

Lake Market—The complete adjustment of the Pittsburgh district labor difficulties has caused a notable easing off in the market, the full extent of which it is not possible to judge at this writing. There were still some minor points in the agreement to be arranged but practically all of the men have resumed work pending a settlement. There has been an insistent and steadily increasing demand from Canada due, it is reported, to a heavy call from abroad and for bunkering purposes. Ohio coals are not so active, Pittsburgh district consumers no longer buying these to make up their shortage. Some buyers from the Upper Lake districts have been canvassing the Ohio market for coal, but have so far not concluded any satisfactory arrangements due to the great scarcity of vessel tonnage, as coal shippers find they are still unable to compete with high rates ore men are offering.

Middle West—While the trade is a trifle easier in spots, and showing a mixed condition at some points, the general situation continues decidedly firmer than is normally the case with the mid-summer market. The spot demand at the distributing centers has shown a tendency to slow down in some cases, though this was later improved by several of the large railroad systems placing orders for additional tonnages. Sales agents are making no effort to force business by offering concessions; on the contrary, they are maintaining a firm attitude as regards prices, and are pointing to the fact that fore-handed consumers will do well to accumulate all possible surpluses at this time as with market conditions as they are now, there is every indication that the fall trade will find an almost unprecedented demand for fuel. A good many smaller mines have increased operations to closely approaching full time, while the output of the larger companies is also increasing, and would be even greater were these companies ready to consider the going prices.

A Year Ago—Anthracite market dull and discouraging. Bituminous continues cheerful, though current market is under a heavy pressure.

Business Opinions

Boston News Bureau—It is a situation that is not very easy to satisfactorily diagnose and not many people are disposed to attempt it. Apparently substantial interests are viewing affairs calmly. The Mexican crisis continues to obscure the many favorable features which are every day appearing. Thus the greatly increased earning power of the country fails to enthuse sentiment as it should, nor does the increased dividend return upon many of the well-known industrial concerns. We pay no particular attention to the enormous inflow of gold nor the improved political outlook. Large financial interests are watching carefully the wage problem, with the hope that it will be satisfactorily adjusted.

Iron Age—Because of the probability of early Government buying of steel products and munitions, the steel trade believes the outcome of the Mexican crisis will be more likely to help than to hurt the market. There is already some figuring in the trade on the possible needs of railroad material for northern Mexico. New inquiries from Europe for bessemer pig iron, steel billets and shell steel are in such volume as to indicate that foreign buyers appreciate the possibility of a check on American shipments of finished munitions.

American Wool and Cotton Reporter—Strengthening in medium scoured wools in anticipation of orders from the United States Government was a prominent feature of the wool market for the week. Sales of wool for use in making uniforms, blankets, etc., have already been consummated. Another interesting feature is the inquiry from big mills which is more general than for some time. The general scarcity is felt just as keenly as ever if not more so. Wool can be bought more cheaply now, it is stated, than it will be possible in two or three months.

Marshall Field & Co.—Current wholesale distribution of dry goods shows a substantial gain over the corresponding period of a year ago. Road sales for immediate delivery are considerably ahead of the corresponding period of several years past and are in greater volume for fall delivery than for the corresponding period of last year. Buyers have attended the market in much larger numbers than during the same week a year ago. Collections show improvement over the corresponding period in 1915. The market on domestic cotton goods is strong.

Bradstreet—New business is good, better than usual at this season, but just now buyers prefer to take a middle ground for their operations, awaiting, the while, crop developments, possible lower prices and freer movements of goods by retail dealers. So far the only effects of the Mexican disturbance besides calling out for service thousands of useful workers, has been stimulation of demand for provisions, essential army equipment, horses and mules. Indeed, it is possible that just as sagging tendencies in trade were logically due, home wants for preparedness may take up the slack. Nevertheless, the situation is marked by the development of some cross currents, certain of which, the quieter tone of steel, the notable weakness in lumber demand and prices, the continued ease in the minor metals, and the laying off of common workmen at a leading munitions plant, disclose ebbing tendencies.

Dun—With the economic structure, through the better organization of banking resources, credits and industry, resting on a more solid foundation than ever before, confidence is unimpaired by the international contingencies. It is noteworthy that speculative markets have been only moderately disturbed and money and legitimate enterprise not at all, though prudence is shown in extending commitments further ahead. Commercial failures this week in the United States are 281 against 295 last week, 287 the preceding week and 431 the corresponding week last year.

Dry Goods Economist—Large manufacturers of wool and worsted dress goods who market their product through jobbers have sold their output for the remainder of the year. In fact, available goods of this class are now very largely in the hands of jobbers, who, in some cases, have done a phenomenal business in their dress goods departments. It is a practical certainty that serges on which cancellations were effected by garment manufacturers whom the strike prevented from taking the goods have been resold by the mills at a profit.

ATLANTIC SEABOARD

BOSTON

Offshore movement still a leading factor in Hampton Roads coals. Georges Creek cargoes slow coming forward and the Pennsylvania grades fairly firm. Anthracite scarce in certain sizes and barge movement very slow.

Bituminous—Because of the unsettled marine transportation conditions the agencies are diffident about naming delivered prices for futures, and the average large purchaser here will not buy on any other basis, as least for the present. The result is a deadlock and some turning to Pennsylvania coals all-rail. For inland distribution there is a fairly steady demand, which, with contract business, is sufficient to keep the steamers in the trade regularly employed, but not enough to encourage speculation "on the market." In other words, the price differential at most New England points is now so much in favor of all-rail coals that only those who feel they must have the smokeless grades are buying them, and no amount of hammering this season could materially increase the tonnage. This of course applies to those who have not made contracts, or did not make them on the low price range last fall.

So far as contract requirements are concerned the supply of Georges Creek is ample at the loading piers, but slow movement coastwise is responsible for more or less anxiety among consumers who have bought their season's supply of this grade. July and August will have to be much more favorable to enable the Georges Creek interests to catch up on their obligations. All-rail delivery continues fair but is of course hampered by rulings of New England railroads as to the amount of traffic they can accept.

The same condition operates against Pennsylvania coals coming forward in as heavy volume as consumers might wish. A good many are seeking to accumulate stocks, but the majority of moderate-sized manufacturers are apparently not paying much heed to possibilities next winter. There is considerably less effort in the way of increasing local storage than might be supposed. It will not be surprising if sharp advances in the Pennsylvania grades come much earlier than last year. Prices have not moved up from a week ago but old options are being withdrawn and quotations now being made are for prompt acceptance, in most cases.

Anthracite—Receipts are beginning to be somewhat better but the reported shortage of egg size is rather alarming to this market. It is the size that dealers put out in largest quantities at this season and there will be a lot of worrying if the scarcity should be anything more than temporary. Pea is also short among some of the shippers, but stove, and chestnut particularly, are available at all the piers.

Barges are moving very slowly and there are today very few Tidewater dealers who are not out of one size or another. Those who have been kept well supplied in the years since 1912 are beginning to appreciate the service they have had and now that the bulk of the supply for this territory devolves upon only a few shippers they are less inclined to be critical than a month ago. In the view of many it will not be possible to get the required tonnage forward. If this turns out to be the case and outside transportation continues at high rates it is hard to see where prices will stop going, once they take the upward trend.

Boston retail prices advanced 25c. on all sizes, effective June 26. This will make stove and chestnut $8, egg, $7.75, and pea $6, all per net ton, delivered, labor extra.

Bituminous prices at wholesale per gross ton f.o.b. loading ports at points designated are about as follows:

	Philadelphia	New York	Baltimore	F.o.b. Mine
Clearfields	$2.35@2.85	$2.65@3.15	.....	$1.10@1.60
Cambrias and Somersets	2.60@3.00	2.90@3.30	.....	1.35@1.75
Georges Creek (contract)	3.07@3.17	3.27@3.37	$3.00@3.10	$2.00@2.10

Pocahontas and New River are $2.85, f.o.b. Norfolk and Newport News, Va., and $4.80@4.90 on cars at Providence and Boston.

NEW YORK

Anthracite operators booked ahead for some sizes. Business remains active. Bituminous in good shape, with prices firm. Better business expected.

Anthracite—Demand for anthracite continues active and most wholesalers have orders on their books which will be carried over into the middle of July. Business is considered good for this season of the year. Most companies are producing all the coal possible under existing labor and car shortages, and many of the mines are working six days a week, as against three days or less this time last year. The situation has been clarified somewhat by the gradual disappearance of petty labor troubles.

The steam coals are quiet and there is practically no demand. Buckwheat No. 1 is easy, but there is no oversupply at Tidewater. Mine quotations for Scranton grades are around $1.65. Rice and barley are quiet, but with a good inquiry for the former size. Prices are steady. Very little of the new boiler size has been seen in the Tidewater market.

Current quotations, per gross ton f.o.b. Tidewater, at the lower ports are as follows:

	Circular	Individual		Circular	Individual
Broken	$4.95	.....	Pea	$3.60	$3.30@3.60
Egg	5.25	$5.20@5.25	Buck	2.75	2.65@2.75
Stove	5.50	5.40@5.50	Rice	2.25	2.20@2.25
Nut	5.55	5.25@5.55	Barley	1.75	1.60@1.75
			Boiler	2.20	

Quotations at the upper ports are generally 5c. higher on account of the difference in water freight rates.

Bituminous—The bituminous situation is in very good shape. While the market is quiet and orders comparatively scarce, prices have been held firm and in some instances are a trifle stronger than a week ago. This is particularly true of the line trade. A slight reaction has taken place as a result of the resumption of operations in the Pittsburgh district. Conditions in central Pennsylvania, however, are still looking serious and a close watch is being kept by local interests.

Export demand is active, but there has been a slight falling off in shipments.

Current quotations for various grades, gross ton, f.o.b. Tidewater, follow:

	South Amboy	Port Reading	St. George	Mine Price
Georges Creek Big Vein	$3.50@3.60	$3.50@3.60	$3.50@3.60	$1.95@2.05
Georges Creek Tyson	3.10@3.25	3.10@3.25	3.10@3.25	1.60@1.80
Clearfield: Medium	2.90@3.00	2.90@3.00	.....	1.40@1.50
South Forks	3.25@3.50	.....	.....	1.70@1.95
Nanty Glo	3.10@3.20	.....	.....	1.55@1.65
Somerset County: Medium	2.90@3.00	2.90@3.00	2.90@3.00	1.40@1.50
Quemahoning	.....	3.00@3.10	3.00@3.10	1.50@1.60
West Virginia Fairmont ¾	.....	3.30@3.40	3.30@3.40	1.50@1.60
Fairmont mine-run	.....	3.30@3.40	3.30@3.40	1.50@1.60
Western Maryland	.....	2.80@2.90	2.80@2.90	1.25@1.35

PHILADELPHIA

Anthracite shows fair business. Price cutting continues. Egg and stove well taken but chestnut weak. Pea inactive. Retail trade quiet, with collections poor.

Anthracite—The rather short production and the removal of embargoes to additional points in New England have helped to keep the market in fair shape. In fact it is rather surprising there is as much cutting as there is, and favored buyers who are offered bargains would do well to fill their bins to their capacity.

The most remarkable offer noted in the past week, was for 4,000 tons of various sizes, the mines prices for which were: 500 tons of egg, $3.70; 1,000 tons of stove, $3.95; 1,500 tons of chestnut, $4.05 and 1,000 tons of pea, $2.35, deliveries to be completed by Sept. 1. These prices compare favorably with bids on some Government business at Washington which were as follows: Egg, $3.65; stove, $4; chestnut, $3.90, all at mines. We also know of a contract calling for 8,000 tons of egg on which a mines price of $3.90 is protected until Mar. 31, 1917. While most shippers are practically sold up on broken coal, occasional blocks of from 50 to 100 tons are moving at from 5 to 15c. off the contract price. Pea coal has shown weakness in many directions and heavy buyers have been named $2.25 for high-grade coal until Sept. 1.

It is significant that many of these cut figures have emanated from one of the big companies which has heretofore been given the credit for doing all in its power to maintain the circular. With these exceptions, the large companies have so far held firm to circular rates, as they expect a strong market in a few months.

On ordinary business the demand for egg and stove continues quite good and will be sold even into August at $3.95 and $4.20 respectively. Egg has shown weakness in spots and at times $3.85 will secure the business. Chestnut continues to be the "off" size and it is doubtful if many of the individuals will insist on the July advance on this grade. In fact an order for a few hundred tons can be placed at almost any time for $4.10. Many tempting proposals on pea coal have been declined by the shippers and a heavy tonnage of this size will probably go to the storage yards to be sold in the fall at full circular price of $2.80.

The companies who issue price circulars were in no particular hurry to get them out for July reducing the discount to 20c. per ton in accordance with the usual custom. Even should any of them decide not to issue a circular, as has been rumored, it is quite likely that they will quote prices similar to the circular rates of other shippers. The circular prices

for July per gross ton at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$3.60	$4.75	Buckwheat	$1.65	$2.55
Egg	3.95	5.05	Rice	1.00	....
Stove	4.20	5.30	Boiler	.90	1.80
Chestnut	4.30	5.35	Barley	.75	....
Pea	2.60	3.50			

Bituminous—The resumption of work in the Pittsburgh district has had its effect on the Fairmont territory. Prices show a tendency to adjust themselves and while most of the grades maintain their prices of last week, there have been recessions of 15c. to 20c. in the slack grades. The other coals sold here remain stationary as to price, with the demand strong and the supply good.

Many shippers believe the military activity may cause a more urgent demand for fuel; it is too early to forecast much as yet although it is recalled that the Spanish-American war boosted the trade quite extensively. The only change noted so far by the calling out of the militia is the additional trouble to keep the mines supplied with labor. The prices per gross ton f.o.b. cars are about as follows this week:

Georges Creek Big Vein	$1.90@2.00	Fairmont gas, ¾	$1.55@1.65
South Fork Miller Vein	1.70@1.80	Fairmont gas, mine-run	1.40@1.50
Clearfield (ordinary)	1.35@1.45	Fairmont gas, slack	1.25@1.35
Somerset (ordinary)	1.30@1.40	Fairmont lump, ordinary	1.40@1.50
West Va. Freeport	1.15@1.25	Fairmont mine-run	1.30@1.40
		Fairmont slack	1.25@1.35

BALTIMORE

Gas coal prices break following Pittsburgh labor agreement. Steam coal market fairly steady. Anthracite trade disappointed by amount of business.

Bituminous—On the heels of the labor agreement in the Pittsburgh district came the expected break in gas coals in West Virginia. After touching $1.50 a ton at the mines in the period of unusual demand, the gas coals began to ease off and are now offering as low as $1.15. The fact that much coal that would have gone to the Lakes was sent to the Pittsburgh district, leaving a gap that must now be filled to the Northwest, holds the market fairly steady. That a further break is due with the final shakedown for the summer is the general belief.

Prices to the trade are about as follows, at the mines, per gross ton: Georges Creek Tyson, $1.75; Miller vein, $1.55; Quemahoning, $1.60; Somerset, $1.45; Freeport, $1.15; Fairmont gas, three-quarter, $1.15; same, mine-run, $1.15; slack, $1.10.

Anthracite—There is a distinct feeling of disapointment that the consuming public did not buy more liberally at the 20c. discount effective until July 1. While the latter part of the low-price period saw considerable orders put on the books a big part of the usual summer trade still remains out.

HAMPTON ROADS

Easier freights stimulating exports. Coastwise shipments steady. Bunker demand good. Stocks light. Anthracite dull.

Declining freight rates, especially to South America, is giving added impetus to the already large export movement. The lower rates, first offered by British steamers, are now also being accepted by neutral tonnage. New inquiries are received in fair number. American coal imported into Brazil during 1915 for the first time exceeded Welsh coal.

New business for Coastwise shipment is scarce, the bulk of the tonnage moving under contract orders. It is reported, however, that stocks are light and will have to be replenished before long.

Bunker steamers are arriving in fair number for this season and a normal volume of this class of business is being done.

The contract for 3,000 tons of Pocahontas, for delivery to the U. S. Engineers, was awarded to the Nottingham & Wrenn Co. at $2.53 per net ton.

Prices are firm, as follows: Pocahontas and New River mine-run, for cargo, $2.85@3 per gross ton; Bunker coal $3.10 @3.30 per gross ton plus trimming; Pocahontas and New River mine-run, on track $2.75 per net ton; anthracite, $7.50 per net ton delivered.

A part cargo of coke of 1,727 tons was shipped to Italy this being the largest single shipment of coke in several months, although small lots are constantly going forward for export.

Railroad Tonnages—Dumpings over the local piers for the past five weeks compare as follows:

Railroad	Week Ending May 27	June 3	June 10	June 17	June 24
Norfolk & Western	160,173	190,408	186,272	153,958	171,394
Chesapeake & Ohio	93,804	100,140	118,809	57,468	95,365
Virginian	79,268	67,196	81,917	39,032	83,408
Totals	323,245	357,744	386,998	250,458	350,163

Ocean Charters and Freights

VESSEL CLEARANCES

The following steamers have cleared from this port during the past week:

NORFOLK

Vessel	Destination	Tons
Eliopoli[15]	Genoa	3,843
Gisela[15]	Naples	3,951
Massapequa[2]	San Juan	4,108
Melrose[2]	Rio Janeiro	6,689
Thur. Castle[17]	Antofagasta	7,086
Aspasia[17]	Piraeus†	3,044
Etna[15]	Spezia, Italy	2,287
Teresa Accame[15]	Porto Ferrajo	6,299
Andrea[15]	Porto Ferrajo	5,574
Lombarda[15]	Annunziata	6,127
Elswick Lodge[5]	Buenos Aires**	4,626
Harbury[5]	Buenos Aires**	6,878
Critchett[15]	St. Georges	848
Colomba[15]	Porto Ferrajo	4,134
Giovanni G[15]	Porto Ferrajo	4,686
Ecclesla[15]	Taranto, Italy	4,915
Bergenhus[16]*	Genoa, Italy	1,727

NEWPORT NEWS

Vessel	Destination	Tons
Montoso[4]	San Juan, P. R.	4,107
Henrik Lund[4]	Rio Janeiro	6,047
Saint Andrew[9]	Antofagasta	7,433
Matoa[4]	Cienfuegos	2,566

NEWPORT NEWS—Continued

Vessel	Destination	Tons
Forde[4]	Cienfuegos	2,857
Oldfield G[4]	Havana, Cuba	7,591
Munalbro[4]	Havana, Cuba	2,661
Aspasia[17]	Piraeus	1,515
Procyon[14]	Buenos Aires	3,303
Carmen[18]	Italy††	7,077

PHILADELPHIA

Vessel	Destination	Tons
Pampa	Buenos Aires	
Santurce[4]	San Juan	
William Cobb*	Bridgewater	
Tordenskjold	Fort de France	
Munalbro	Havana	
Pathfinder[4]	Guayanilla	
F. Brainerd	Nassau	198
Albania	Genoa & Spezia	
W. L. Maxwell	St. John's	

BALTIMORE

Vessel	Destination	Tons
Tiberia	Ecuador	6,994
Claveresk	Cuba	6,100
Vindegge	Norway	3,569
Frontera	Mexico	225

[1] Atwater & Co. [2] Baker Whiteley [3] Barber & Co. [4] Berwind-White [5] C. G. Blake Co. [6] Castner, Cur. & Bul. [7] Ches. & O. Coal A. Co. [8] Ches. & O. C. & C. Co. [9] Crozer-Pocahontas Co. [10] Dexter & Carpenter [11] Flat Top Fuel Co. [12] Hasler Brothers [13] Houston Coal Co. [14] Maryland C. & C. Co. [15] New River Coal Co. [16] Pocahontas Fuel Co. [17] Smokeless Fuel Co. [18] C. H. Sprague & Son [19] White Oak Coal Co. [20] Northern Coal Co.

* Coke. † Greece, via Newport News. ** For orders. †† Gibraltar for orders.

OCEAN FREIGHTS

Coal freight charters have been reported as follows during the past week:

VIRGINIA

Vessel	Destination	Tons	Rate
Freja	R. Plata[2]		$19.20
Jacksonville	Bermuda	547	4.25[2]
Suig	R. Plata	1,976	
Maelia	Santos		
Snig	Montevideo or B. Aires		18.50
A. H. Willis	Azores		14.00

BALTIMORE

Vessel	Destination	Tons	Rate
Sark	B. Aires	2,309	$19.20
Claveresk	Cuba	2,441	
Apoilo	Bahia		

PHILADELPHIA

Vessel	Destination	Tons	Rate
Palatka	Porto Rico	367	$6.00
J. M. Haynes	Azores	683	14.00

ATLANTIC RANGE

Vessel	Destination	Tons	Rate
Arborean	W. C. So. Am.	3,652	$12.00[1]
Sark	B. Aires	2,304	12.00

NEW YORK

Vessel	Destination	Tons	Rate
C. W. Alcott	Isleford	281	$2.00

[1] 1,000 tons per day discharge. [2] Discharged and port charges.

OCEAN FREIGHTS

Freight rates are at about the same level as a week ago and none of the recent fixtures for export coal have been reported. We would qnote freight rates on coal by steamer as follows:

To	Rate	To	Rate
Havana	$4.25	Bermuda	$4.50@5.00
Cardenas or Sagua	5.50@6.00	Vera Cruz	6.00@6.50
Cienfuegos	5 50@5.75	Tampico	6.00@6.50
Port au Spain, Trinidad	6.50 about	Rio Janeiro	[4]19.00 about
St. Lucia	6.50 about	Santos*	[3]19.75 about
St. Thomas	6.00 about	Montevideo	19.20 about
Barbados	6.50 about	BuenosAires orLa Plata	19.20 about
Kingston	5.50@6.00	Rosario	20.40 about
Curacao	[2]6.25 about	West Coast of Italy	30.60 about
Santiago	5.50@6.00	Barcelona***	24.00 about
Guantanamo	5.50@6.00	Chile (good port)	[2]12.00 about
Demerara		Marseilles	28.80 about

* Consignees paying dockage dues. ** Spanish dues for account of cargo.

[1] 500 tons discharge. [2] 700 tons discharge. [3] And p.c. [4] Net, 1,000 tons discharge. [5] Or other good Spanish port.

W. W. Battie & Co.'s Coal Trade Freight Report.

COASTWISE FREIGHTS

There is no preceptible change in rates from Hampton Roads to Boston. Steamers can be had at $1.90@2, and barges at from $2.10@2.25. To points like Providence and New Bedford, $1.85 is still a low rate. One of the curious developments is that small sailing vessels, 700 to 900 tons, for some reason presumably unfit for off-shore trade are asking $3 from Hampton Roads to points east of Boston, while at the same time similar vessels will accept $1.60@1.75 for New York loading. This is perhaps the greatest differential we have known, even in the days of 1902. One coal man at Norfolk said recently he had not heard of a single sailing vessel offering there for coastwise charter since Jan. 1. Rates on barges to Long Island Sound points out of New York are still 85@90c.

LAKE MARKETS

PITTSBURGH

Complete adjustment of labor troubles and maket substantially easier. Heavier production of Lake coal.

Many additional coal miners resumed work early this week and the backbone of the suspension is broken. Operations are at fully three-fourths of capacity, and by the end of the week all the miners will probably be at work, though there may not be as many in the district as before this trouble started. There are various matters still to be settled, but the men have gone to work pending the settlement.

There is no prompt coal market, as there has been no time to develop new prices as yet. The market is still made largely by West Virginia coal, the Lower Connellsville operators being less interested than formerly, now that bid prices are lower. There seems to be heavier production of Lake coal, as slack is considerably easier and at least 25c. below mine-run. Westmoreland gas coal brings up to $1.75, but the ordinary market for prompt steam coal is on the basis of $1.50, Pittsburgh district mine, the various sellers equalizing their prices with this basis. The circular price of $1.50 is nominal. We quote: Slack, $1.25; mine-run, $1.50@1.75; ¾-in., $1.60@1.75; 1¼-in., $1.70@1.85, per net ton, f.o.b. mine, Pittsburgh district.

BUFFALO

Market still rather quiet. Many bituminous miners out. Anthracite men working slow. City market dull.

The heavy consumers are carrying so much coal that they will probably be indifferent to the market for some time, though the small consumers are buying as they have little storage room. The heavy movement into St. Lawrence River territory continues. The congestion at Sodus Point has been somewhat relieved, but that port is making record shipments still.

Prices are steady, with slack scarce. Quotations:

	Pittsburgh	Allegheny Valley	Penn Smokeless
Lump	$2.95	$2.75	$2.80
Three-quarter	2.85	2.60	....
Mine run	2.75	2.50	2.60
Slack	2.40	2.30	2.60

Prices are per net ton, except east of Rochester and Kingston, Ont., where they are per gross ton.

Anthracite—Trade is about normal, with a stir as usual near the end of the month, on account of the higher July price. The movement is not as large as it should be, either by Lake or all-rail. In the city trade, retailers are looking for other work to keep their equipment earning something through the mid-season.

The shipment by Lake has improved somewhat. Possibly taking into account the amount which goes to Erie, Penn., for loading, it is about up to normal. The amount for the week was 83,500 tons, of which 25,500 tons cleared for Duluth and Superior, 14,400 tons for Fort William, 10,900 tons for Chicago 10,600 tons for Port Arthur, 7,500 tons for Waukegan, 7,000 tons for Escanaba, 3,000 tons for Houghton, 2,800 tons for Marquette, and 1,800 tons for Racine.

TORONTO, CAN.

Anthracite quiet and bituminous steady. Yards well stocked.

Sales of anthracite have been light as is usual at this season. Bituminous is in fair demand and dealers have good stocks on hand. Railroad deliveries have been considerably delayed by the strike of clerks and car checkers at Black Rock, but since the settlement of the difficulty consignments have been coming forward freely.

Quotations for best grades per short ton are as follows: Retail anthracite, egg, stove and nut, $8; grate, $7.75; pea, $6.75; bituminous steam, $5.25; screenings, $4.50; domestic lump, $6; cannel, $8. Wholesale f.o.b. cars at destination, bituminous three-quarter lump, $4; screenings, $3.25; Pennsylvania smokeless lump, $4.50; Pocahontas lump, $5.50; slack, $3.75.

TOLEDO

The steam business is holding up well and prices are strong. The Lake trade continues heavy and the only difficulty seems to be in securing enough boats to move the coal. Ore trade is extremely heavy and this accounts largely for the scarcity of boats. There is a large amount of coal on track here and there has never been a season when so much coal has passed through this port.

DETROIT

Steam coal orders less than expected. Domestic sizes and anthracite quiet. High rates feature shipments to Lake Michigan.

Bituminous—Steam consumers do not show the interest that wholesalers had expected. Most orders specify small sizes, with nut, pea and slack apparently in most demand; the price is quite steady at 90c. f.o.b. mines. Only a very small business is being done in domestic sizes. Consumers seem to have little interest in the market and retailers are withholding orders.

Anthracite—Neither retailers nor consumers manifest much interest in anthracite, though stove size is difficult to obtain at times. Wholesalers say very little effort has been made by retailers to put in stock.

Lake Trade—Scarcity of vessels for shipping coal to Lake Michigan ports continues, while carriers are very busy in the iron ore and grain trade from Lake Superior. Vessels can obtain charters to move ore from the head of Lake Superior at $1, from Marquette at 90c. and from Escanaba at 75 and 85c., while grain cargoes from the head of the Lakes pay 4½c. a bushel, so that coal shippers are forced to bid high. One small cargo was placed during the week at 75c. to Milwaukee from a Lake Erie port.

CLEVELAND

Demand centers on slack coal. Pittsburgh district mines resume. Lake Michigan buyers looking for coal.

The market is quiet with the exception of slack which is in demand, especially No. 8. While there is plenty of slack billed to this market it appears that the railroads are slow in bringing it in, but the coming week's supply will more than likely soften prices a trifle. There is absolutely no demand for coarse coals. The miners in the entire Pittsburgh field were ordered back to work on June 20, and even though the men are slow in resuming it has stopped the consumers from buying Ohio coals to replace the Pittsburgh product.

Bids were received this week by the City of Cleveland for 30,000 tons of slack for the Municipal Electric Light plant; $2.09 was bid on West Virginia gas slack, and $2.15 on Pittsburgh No. 8. The contract has not been let as yet.

There have been two or three Lake Michigan buyers in Cleveland who have been offered all grades of Lake coal for any size cargoes for immediate shipment, but they have been unable to secure the vessels to move same.

Following are the market prices, f.o.b. Cleveland:

	Three-quarter	Mine-run	Slack		Three-quarter	Mine-run	Slack
No. 8	$2.10	$2.00	$1.95	Youghiogheny	$2.60	$2.50	.....
Cambridge	2.10	2.00	1.95	Pittsburgh	2.60	2.50	.....
Middle Dist.	2.05	1.90	1.90	Pocahontas	....	2.70	.....
Hocking	....	....	1.85	Fairmont	2.10	2.00	$1.95

COLUMBUS

Slightly better tone and prices are stiffening. Congestion on the railroads and car shortage developing. Production increasing.

The trade has been rather active the past week, with the exception of domestic lines, where the volume of business is not large. Lake and steam trade is good and the tone of the market is generally satisfactory. Prospects for the future are bright, especially in view of an approaching car shortage, which will make it difficult to secure prompt shipments.

The excessive rains have interfered with the retail end of the business, both in rural and city sections. Dealers are not buying to any extent because of the slow movement from their yards. Farmers have been too busy with their crops to haul coal, except in cases of dire necessity. Dealers are placing orders for July delivery, but wholesalers and producers are loath to accept orders for August shipment at present quotations.

In steam circles trade is generally brisk. Factories are buying for immediate use and are not storing much fuel ahead. A large proportion of the steam contracts have been closed.

The car shortage is delaying deliveries and this condition is expected to grow worse. There is a better demand for nut, pea and slack and other small sizes, and prices remain firm.

The Lake trade remains active and the tonnage being shipped from both Ohio and West Virginia mines to the head of the Lakes shows no diminution. Boats are fairly plentiful and the movement of bottoms is steady. Loading machinery at all of the lower Lake ports is working night and day.

Prices on short tons f.o.b. mines are as follows:

	Hocking	Pomeroy	East Ohio		Hocking	Pomeroy	East Ohio
Re-screened lump	$1.60	$1.70	.....	Egg	$1.30	$1.35	....
Inch and a quarter	1.50	1.50	$1.40	Mine-run	1.20	1.20	$1.15
Three-quarter-inch	1.40	1.40	1.30	Nut, pea and slack	.90	.90	.90
Nut	1.30	1.30	.....	Coarse slack	.80	.80	.80

for July per gross ton at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$3.60	$4.75	Buckwheat	$1.65	$2.55
Egg	3.95	5.05	Rice	1.00	....
Stove	4.20	5.30	Boiler	.90	1.80
Chestnut	4.30	5.35	Barley	.75	....
Pea	2.60	3.50			

Bituminous—The resumption of work in the Pittsburgh district has had its effect on the Fairmont territory. Prices show a tendency to adjust themselves and while most of the grades maintain their prices of last week, there have been recessions of 15c. to 20c. in the slack grades. The other coals sold here remain stationary as to price, with the demand strong and the supply good.

Many shippers believe the military activity may cause a more urgent demand for fuel; it is too early to forecast much as yet although it is recalled that the Spanish-American war boosted the trade quite extensively. The only change noted so far by the calling out of the militia is the additional trouble to keep the mines supplied with labor. The prices per gross ton f.o.b. cars are about as follows this week:

Georges Creek Big Vein	$1.90@2.00	Fairmont gas, ¾	$1.55@1.65
South Fork Miller Vein	1.70@1.80	Fairmont gas, mine-run	1.40@1.50
Clearfield (ordinary)	1.35@1.45	Fairmont gas, slack	1.25@1.35
Somerset (ordinary)	1.30@1.40	Fairmont lump, ordinary	1.40@1.50
West Va. Freeport	1.15@1.25	Fairmont mine-run	1.30@1.40
		Fairmont slack	1.25@1.35

BALTIMORE

Gas coal prices break following Pittsburgh labor agreement. Steam coal market fairly steady. Anthracite trade disappointed by amount of business.

Bituminous—On the heels of the labor agreement in the Pittsburgh district came the expected break in gas coals in West Virginia. After touching $1.50 a ton at the mines in the period of unusual demand, the gas coals began to ease off and are now offering as low as $1.15. The fact that much coal that would have gone to the Lakes was sent to the Pittsburgh district, leaving a gap that must now be filled to the Northwest, holds the market fairly steady. That a further break is due with the final shakedown for the summer is the general belief.

Prices to the trade are about as follows, at the mines, per gross ton: Georges Creek Tyson, $1.75; Miller vein, $1.55; Quemahoning, $1.60; Somerset, $1.45; Freeport, $1.15; Fairmont gas, three-quarter, $1.15; same, mine-run, $1.15; slack, $1.10.

Anthracite—There is a distinct feeling of disapointment that the consuming public did not buy more liberally at the 20c. discount effective until July 1. While the latter part of the low-price period saw considerable orders put on the books a big part of the usual summer trade still remains out.

HAMPTON ROADS

Easier freights stimulating exports. Coastwise shipments steady. Bunker demand good. Stocks light. Anthracite dull.

Declining freight rates, especially to South America, is giving added impetus to the already large export movement. The lower rates, first offered by British steamers, are now also being accepted by neutral tonnage. New inquiries are received in fair number. American coal imported into Brazil during 1915 for the first time exceeded Welsh coal.

New business for Coastwise shipment is scarce, the bulk of the tonnage moving under contract orders. It is reported, however, that stocks are light and will have to be replenished before long.

Bunker steamers are arriving in fair number for this season and a normal volume of this class of business is being done.

The contract for 3,000 tons of Pocahontas, for delivery to the U. S. Engineers, was awarded to the Nottingham & Wrenn Co. at $2.53 per net ton.

Prices are firm, as follows: Pocahontas and New River mine-run, for cargo, $2.85@3 per gross ton; Bunker coal $3.10 @3.30 per gross ton plus trimming; Pocahontas and New River mine-run, on track $2.75 per net ton; anthracite, $7.50 per net ton delivered.

A part cargo of coke of 1,727 tons was shipped to Italy this being the largest single shipment of coke in several months, although small lots are constantly going forward for export.

Railroad Tonnages—Dumpings over the local piers for the past five weeks compare as follows:

Railroad	Week Ending May 27	June 3	June 10	June 17	June 24
Norfolk & Western	160,173	190,408	186,272	153,958	171,394
Chesapeake & Ohio	93,804	100,140	118,809	57,468	95,365
Virginian	79,268	67,196	81,917	39,032	83,408
Totals	323,245	357,744	386,998	250,458	350,163

Ocean Charters and Freights

VESSEL CLEARANCES

The following steamers have cleared from this port during the past week:

NORFOLK

Vessel	Destination	Tons
Eliopoli[16]	Genoa	3,843
Gisela[16]	Naples	3,951
Massapequa[2]	San Juan	4,108
Melrose[2]	Rio Janeiro	6,689
Thur. Castle[17]	Antofagasta	7,086
Aspasia[17]	Piraeus†	3,044
Etna[16]	Spezia, Italy	2,287
Teresa Accame[16]	Porto Ferrajo	6,299
Andrea[16]	Porto Ferrajo	5,574
Lombarda[16]	Annunziata	6,127
Elswick Lodge[6]	Buenos Aires**	4,626
Harbury[6]	Buenos Aires**	6,878
Critchett[16]	St. Georges	848
Colomba[16]	Porto Ferrajo	4,134
Giovanni G[16]	Porto Ferrajo	4,686
Ecclesia[15]	Taranto, Italy	4,915
Bergenhus[16]*	Genoa, Italy	1,727

NEWPORT NEWS

Vessel	Destination	Tons
Montoso[4]	San Juan, P. R.	4,107
Henrik Lund[4]	Rio Janeiro	6,047
Saint Andrew[6]	Antofagasta	7,433
Matoa[4]	Cienfuegos	2,566

NEWPORT NEWS—Continued

Vessel	Destination	Tons
Forde[4]	Cienfuegos	2,857
Oldfield G[4]	Havana, Cuba	7,591
Munalbro[4]	Havana, Cuba	2,661
Aspasia[17]	Piraeus	1,515
Procyon[14]	Buenos Aires	3,303
Carmen[18]	Italy††	7,077

PHILADELPHIA

Vessel	Destination	Tons
Pampa	Buenos Aires	
Santurce[4]	San Juan	
William Cobb*	Bridgewater	
Tordenskjold	Fort de France	
Munalbro	Havana	
Pathfinder[4]	Guayanilla	
F. Brainerd	Nassau	198
Albania	Genoa & Spezia	
W. L. Maxwell	St. John's	

BALTIMORE

Vessel	Destination	Tons
Tiberia	Ecuador	6,994
Claveresk	Cuba	6,100
Vindegge	Norway	3,569
Frontera	Mexico	225

[1] Atwater & Co. [2] Baker Whiteley [3] Barber & Co. [4] Berwind-White [5] C. G. Blake Co. [6] Castner, Cur. & Bul. [7] Ches. & O. Coal A. Co. [8] Ches. & O. C. & C. Co. [9] Crozer-Pocahontas Co. [10] Dexter & Carpenter [11] Flat Top Fuel Co. [12] Hasler Brothers [13] Houston Coal Co. [14] Maryland C. & C. Co. [15] New River Coal Co. [16] Pocahontas Fuel Co. [17] Smokeless Fuel Co. [18] C. H. Sprague & Son [19] White Oak Coal Co. [20] Northern Coal Co.

* Coke. † Greece, via Newport News. ** For orders. †† Gibraltar for orders.

OCEAN FREIGHTS

Coal freight charters have been reported as follows during the past week:

VIRGINIA

Vessel	Destination	Tons	Rate
Freja	R. Plata[2]		$19.20
Jacksonville	Bermuda	547	4.25[2]
Suig	R. Plata	1,976	
Maelia	Santos		
Snig	Montevideo or B. Aires		18.50
A. H. Willis	Azores		14.00

BALTIMORE

Vessel	Destination	Tons	Rate
Sark	B. Aires	2,309	$19.20
Claveresk	Cuba	2,441	
Apoilo	Bahia		

PHILADELPHIA

Vessel	Destination	Tons	Rate
Palatka	Porto Rico	367	$6.00
J. M. Haynes	Azores	683	14.00

ATLANTIC RANGE

Vessel	Destination	Tons	Rate
Arborean	W. C. So. Am.	3,652	$12.00[1]
Sark	B. Aires	2,304	12.00

NEW YORK

Vessel	Destination	Tons	Rate
C. W. Alcott	Isleford	281	$2.00

[1] 1,000 tons per day discharge. [2] Discharged and port charges.

OCEAN FREIGHTS

Freight rates are at about the same level as a week ago and none of the recent fixtures for export coal have been reported. We would qnote freight rates on coal by steamer as follows:

To	Rate	To	Rate
Havana	$4.25	Bermuda	$4.50@5.00
Cardenas or Sagua	5.50@6.00	Vera Cruz	6.00@6.50
Cienfuegos	5 50@5.75	Tampico	6.00@6.50
Port au Spain, Trinidad	6.50 about	Rio Janeiro	[4]19.00 about
St. Lucia	6.50 about	Santos*	[4]19.75 about
St. Thomas	6.00 about	Montevideo	19.20 about
Barbados	6.50 about	BuenosAires orLa Plata	19.20 about
Kingston	5.50@6.00	Rosario	20.40 about
Curacao	[3]6.25 about	West Coast of Italy	30.60 about
Santiago	5.50@6.00	Barcelona***	24.00 about
Guantanamo	5.50@6.00	Chile (good port)	[3]12.00 about
Demerara		Marseilles	28.80 about

* Consignees paying dockage dues. ** Spanish dues for account of cargo. [1] 500 tons discharge. [2] 700 tons discharge. [3] And p.c. [4] Net, 1,000 tons discharge. [5] Or other good Spanish port.

W. W. Battie & Co.'s Coal Trade Freight Report.

COASTWISE FREIGHTS

There is no preceptible change in rates from Hampton Roads to Boston. Steamers can be had at $1.90@2, and barges at from $2.10@2.25. To points like Providence and New Bedford, $1.85 is still a low rate. One of the curious developments is that small sailing vessels, 700 to 900 tons, for some reason presumably unfit for off-shore trade are asking $3 from Hampton Roads to points east of Boston, while at the same time similar vessels will accept $1.60@1.75 for New York loading. This is perhaps the greatest differential we have known, even in the days of 1902. One coal man at Norfolk said recently he had not heard of a single sailing vessel offering there for coastwise charter since Jan. 1. Rates on barges to Long Island Sound points out of New York are still 85@90c.

LAKE MARKETS

PITTSBURGH

Complete adjustment of labor troubles and maket substantially easier. Heavier production of Lake coal.

Many additional coal miners resumed work early this week and the backbone of the suspension is broken. Operations are at fully three-fourths of capacity, and by the end of the week all the miners will probably be at work, though there may not be as many in the district as before this trouble started. There are various matters still to be settled, but the men have gone to work pending the settlement.

There is no prompt coal market, as there has been no time to develop new prices as yet. The market is still made largely by West Virginia coal, the Lower Connellsville operators being less interested than formerly, now that bid prices are lower. There seems to be heavier production of Lake coal, as slack is considerably easier and at least 25c. below mine-run. Westmoreland gas coal brings up to $1.75, but the ordinary market for prompt steam coal is on the basis of $1.50, Pittsburgh district mine, the various sellers equalizing their prices with this basis. The circular price of $1.50 is nominal. We quote: Slack, $1.25; mine-run, $1.50@1.75; ¾-in., $1.60@1.75; 1¼-in., $1.70@1.85, per net ton, f.o.b. mine, Pittsburgh district.

BUFFALO

Market still rather quiet. Many bituminous miners out. Anthracite men working slow. City market dull.

The heavy consumers are carrying so much coal that they will probably be indifferent to the market for some time, though the small consumers are buying as they have little storage room. The heavy movement into St. Lawrence River territory continues. The congestion at Sodus Point has been somewhat relieved, but that port is making record shipments still.

Prices are steady, with slack scarce. Quotations:

	Pittsburgh	Allegheny Valley	Penn Smokeless
Lump	$2.95	$2.75	$2.80
Three-quarter	2.85	2.60	....
Mine run	2.75	2.50	2.60
Slack	2.40	2.30	2.60

Prices are per net ton, except east of Rochester and Kingston, Ont., where they are per gross ton.

Anthracite—Trade is about normal, with a stir as usual near the end of the month, on account of the higher July price. The movement is not as large as it should be, either by Lake or all-rail. In the city trade, retailers are looking for other work to keep their equipment earning something through the mid-season.

The shipment by Lake has improved somewhat. Possibly taking into account the amount which goes to Erie, Penn., for loading, it is about up to normal. The amount for the week was 83,500 tons, of which 25,500 tons cleared for Duluth and Superior, 14,400 tons for Fort William, 10,900 tons for Chicago 10,600 tons for Port Arthur, 7,500 tons for Waukegan, 7,000 tons for Escanaba, 3,000 tons for Houghton, 2,800 tons for Marquette, and 1,800 tons for Racine.

TORONTO, CAN.

Anthracite quiet and bituminous steady. Yards well stocked.

Sales of anthracite have been light as is usual at this season. Bituminous is in fair demand and dealers have good stocks on hand. Railroad deliveries have been considerably delayed by the strike of clerks and car checkers at Black Rock, but since the settlement of the difficulty consignments have been coming forward freely.

Quotations for best grades per short ton are as follows: Retail anthracite, egg, stove and nut, $8; grate, $7.75; pea, $6.75; bituminous steam, $5.25; screenings, $4.50; domestic lump, $6; cannel, $8. Wholesale f.o.b. cars at destination, bituminous three-quarter lump, $4; screenings, $3.25; Pennsylvania smokeless lump, $4.50; Pocahontas lump, $5.50; slack, $3.75.

TOLEDO

The steam business is holding up well and prices are strong. The Lake trade continues heavy and the only difficulty seems to be in securing enough boats to move the coal. Ore trade is extremely heavy and this accounts largely for the scarcity of boats. There is a large amount of coal on track here and there has never been a season when so much coal has passed through this port.

DETROIT

Steam coal orders less than expected. Domestic sizes and anthracite quiet. High rates feature shipments to Lake Michigan.

Bituminous—Steam consumers do not show the interest that wholesalers had expected. Most orders specify small sizes, with nut, pea and slack apparently in most demand; the price is quite steady at 90c. f.o.b. mines. Only a very small business is being done in domestic sizes. Consumers seem to have little interest in the market and retailers are withholding orders.

Anthracite—Neither retailers nor consumers manifest much interest in anthracite, though stove size is difficult to obtain at times. Wholesalers say very little effort has been made by retailers to put in stock.

Lake Trade—Scarcity of vessels for shipping coal to Lake Michigan ports continues, while carriers are very busy in the iron ore and grain trade from Lake Superior. Vessels can obtain charters to move ore from the head of Lake Superior at $1, from Marquette at 90c. and from Escanaba at 75 and 85c., while grain cargoes from the head of the Lakes pay 4½c. a bushel, so that coal shippers are forced to bid high. One small cargo was placed during the week at 75c. to Milwaukee from a Lake Erie port.

CLEVELAND

Demand centers on slack coal. Pittsburgh district mines resume. Lake Michigan buyers looking for coal.

The market is quiet with the exception of slack which is in demand, especially No. 8. While there is plenty of slack billed to this market it appears that the railroads are slow in bringing it in, but the coming week's supply will more than likely soften prices a trifle. There is absolutely no demand for coarse coals. The miners in the entire Pittsburgh field were ordered back to work on June 20, and even though the men are slow in resuming it has stopped the consumers from buying Ohio coals to replace the Pittsburgh product.

Bids were received this week by the City of Cleveland for 30,000 tons of slack for the Municipal Electric Light plant; $2.09 was bid on West Virginia gas slack, and $2.15 on Pittsburgh No. 8. The contract has not been let as yet.

There have been two or three Lake Michigan buyers in Cleveland who have been offered all grades of Lake coal for any size cargoes for immediate shipment, but they have been unable to secure the vessels to move same.

Following are the market prices, f.o.b. Cleveland:

	Three-quarter	Mine-run	Slack		Three-quarter	Mine-run	Slack
No. 8	$2.10	$2.00	$1.95	Youghiogheny	$2.60	$2.50	.....
Cambridge	2.10	2.00	1.95	Pittsburgh	2.60	2.50	.....
Middle Dist.	2.05	1.90	1.90	Pocahontas	....	2.70	
Hocking	....	....	1.85	Fairmont	2.10	2.00	$1.95

COLUMBUS

Slightly better tone and prices are stiffening. Congestion on the railroads and car shortage developing. Production increasing.

The trade has been rather active the past week, with the exception of domestic lines, where the volume of business is not large. Lake and steam trade is good and the tone of the market is generally satisfactory. Prospects for the future are bright, especially in view of an approaching car shortage, which will make it difficult to secure prompt shipments.

The excessive rains have interfered with the retail end of the business, both in rural and city sections. Dealers are not buying to any extent because of the slow movement from their yards. Farmers have been too busy with their crops to haul coal, except in cases of dire necessity. Dealers are placing orders for July delivery, but wholesalers and producers are loath to accept orders for August shipment at present quotations.

In steam circles trade is generally brisk. Factories are buying for immediate use and are not storing much fuel ahead. A large proportion of the steam contracts have been closed.

The car shortage is delaying deliveries and this condition is expected to grow worse. There is a better demand for nut, pea and slack and other small sizes, and prices remain firm.

The Lake trade remains active and the tonnage being shipped from both Ohio and West Virginia mines to the head of the Lakes shows no diminution. Boats are fairly plentiful and the movement of bottoms is steady. Loading machinery at all of the lower Lake ports is working night and day.

Prices on short tons f.o.b. mines are as follows:

	Hocking	Pomeroy	East Ohio		Hocking	Pomeroy	East Ohio
Re-screened lump	$1.60	$1.70	.....	Egg	$1.30	$1.35	....
Inch and a quarter	1.50	1.50	$1.40	Mine-run	1.20	1.20	$1.15
Three-quarter-inch	1.40	1.40	1.30	Nut, pea and slack	.90	.90	.90
Nut	1.30	1.30	.....	Coarse slack	.80	.80	.80

CINCINNATI

Steam demand improving and retailers coming into the market. Car and labor supply continue inadequate.

A steadily improving demand in all departments is noted. The increasing strength is tending to convince buyers that they will probably pay more for coal later on and have more difficulty in getting it. The spot market for steam coal has been exceptionally strong, both nut and slack and mine-run being in strong demand at prices ranging around 80c. for the former and $1 and $1.05 for the latter.

LOUISVILLE

Normal midsummer market prevails in Kentucky field. Car supply shows improvement. Contract business active.

Kentucky operators, except where they are shipping principally on contracts, report conditions virtually normal, with rather a slender demand for domestic sizes although there is some disposition to stock on the part of retailers. The car shortage which has been a good deal of a factor is believed to be improving, terminal yards showing a marked increase in the number of foreign cars.

COKE

CONNELLSVILLE

Much competition in furnace coke contracts, Pocahontas selling in West and Lehigh Coke Co. in East. Foundry coke demand fair. Production and shipments increased.

The position of operators has visibly weakened, in negotiations on second-half furnace coke. Those who had been strong at $2.75 are now rather willing to accept $2.65, while others who would have shaded $2.75 a trifle a fortnight ago would now probably sell at $2.50 on a contract otherwise favorable. There is even a rumor that a fair sized contract has been put through at $2.35, and for a standard grade, but this is not confirmed.

Doubtless the operators are thinking more about the fourth quarter than they were. They recognize that there will be a considerable increase in byproduct coke production shortly, say in August or September, and that would tend to make coke less valuable for fourth than for third quarter. The operators are quite indisposed to sell a quarter at a time but may be compelled to do so in some instances. It has been well shown by the record of the past few months that the Connellsville region can easily make all the coke it can be called upon for, since it has met requirements thus far and it is made clear that the blast furnace activity of the country cannot be materially increased.

One or two consumers in the Chicago district, who were negotiating more or less for Connellsville coke, have closed for Pocahontas, there being 25c. less freight to pay. Two or three Eastern consumers, who have bought Connellsville regularly, have contracted with the Lehigh Coke Co., the Bethlehem Steel Corporation's subsidiary, as with the doubling of the Lehigh plant, originally 214 ovens, practically completed there is surplus coke for the open market.

Foundry coke is in fair demand for prompt, and some consumers who did not contract a couple of months ago, when there was a movement on, are now closing contracts for the 6 or 12 months beginning July 1. We quote: Spot furnace, $2.40@2.50; contract; $2.50@2.65; prompt foundry, $3.25@3.50; contract, $3.50, per net ton at ovens.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended June 17 at 433,176 tons, an increase of 27,372 tons, and shipments at 433,630 tons, an increase of 25,247 tons. These increases represent in chief part the decrease in shipments of raw coal, sold when the Pittsburgh market for prompt coal was quite high on account of the strike.

Buffalo—The demand for coke has not improved and does not seem to promise improvement right away. The feeling of scarcity has gone, so that the consmuer, as in the case of bituminous coal, is ready to go on with a light stock if prices do not suit him. Coke prices remain on the basis of $5.10 for foundry, $4.60 for furnace and $3.35 for stock.

Chicago—The spot coke market is uncertain, with prices still prevailing at a high range. No change has occurred in furnace and foundry coke since last week. Prices per net ton f.o.b. cars Chicago are as follows: Connellsville, $6@6.25; Wise County, $6@6.25; Byproduct foundry, $6@6.25; Byproduct Domestic, $4.95@5.20; Gas House, $4.50@4.60.

St. Louis—Byproduct coke is quoted at around $5.25 per ton St. Louis. Nearly all of the coke producers are oversold and are talking higher prices. The output of domestic coke is moving readily at from $4.50 for present shipment to $5.25 for shipments to be made during the fall season.

MIDDLE WESTERN

GENERAL REVIEW

Market rather quiet with production about 50% capacity. Domestic buying shows betterment. Steam grades maintain strength. Eastern bituminous coals slightly easier.

Western trade conditions seem to have lapsed into summer dullness, although a slight increase is seen in buying from the country districts. Spot demand in distributing centers is rather weak. While interior retail dealers have shown some disposition to place contract orders to fill up their bins, storage by retailers and steam users is very backward. Both operators and the railroads have urged the trade to inaugurate early storing of coal, fearing a shortage of cars and labor later, but these warnings seem to have no effect, and the approach of fall will naturally see much higher prices with the mines taxed to their utmost to meet demands.

No attempts at stimulating of business by reduced prices are noticeable. Quotations are firm and shippers feel that a rush of business is bound to come sooner or later. Stocks in retail yards of the larger cities are ample, but consumers have so far bought but little storage coal. Most steam coal is moving on contracts, with open shipments of screenings averaging near the dollar mark. Increased buying of smokeless sizes on the part of country dealers is apparent.

It is reported that comparatively little coal is moving from the docks in the Northwest to interior points. Steam contracting in that section is slow, and it is likely that less tonnage will be tied up under contracts this year than usual for the reason that the agencies expect market conditions will have improved later to such an extent that shippers will make a handsome profit on any free coal they have to offer.

ST. LOUIS

Mines running about four days a week and market readily absorbing the output. Operators will not force the market. Prices are nominal.

The market on Standard coal is very steady. Several large railroads have placed orders through the big jobbing houses and these are taking care of all the surplus coal. A number of smaller mines are running almost full time, and the larger mines are averaging about three or four days a week. There are a number of mines which are not willing to accept the current prices, and are running on their contract business, waiting for a better open market.

Although it is scarcely the mid-summer season yet cars on all lines are beginning to be scarce. Some roads are actually facing a shortage in spite of the fact that the mines on their lines are only attempting to run three or four days a week. Indications point to a heavy industrial, railroad and domestic demand, together with a car shortage this fall, all of which will mean a stiff market and high prices.

In the Standard field the situation is better than any other district in Illinois, though their prices are not quite up to the level they should be. The other districts are all holding firm on price, and are running at least half time. Domestic demand for Franklin County coal is continually getting better. The surplus of lump coal in this district is gradually being reduced.

The market is quotable on the following basis per net ton, f.o.b. mines:

	Franklin County	Williamson	Staunton and Montgomery	Intermediate	Standard
6-in. lump	$1.55	$1.45	$1.25	$1.25	$1.00
6x3-in. egg	1.55	1.45	1.25	1.25	1.00
3x2-in. nut	1.55	1.45	1.25	1.25	.90
No. 2 nut	1.45	1.20	1.00	1.00	.90
No. 3 nut	1.40	1.15	.....	.....	.....
No. 4 nut	1.25	1.00	.....	.....	.....
No. 5 nut	.75	.70	.....	.....	.....
Screenings	.95	.90	.90	.85	.85
2-in. lump	.....	.....	1.15	1.00	.85
Steam egg	.....	.....	1.10	.95	.85
Mine-run	1.25	1.10	1.05	.95	.85
Washed	.....	.....	.....	.....	.....
No. 1 nut	.....	1.55	1.40	1.35	1.30
No. 2 nut	.....	1.45	1.25	1.20	1.20
No. 3 nut	.....	1.30	1.20	1.20	1.20
No. 4 pea	.....	1.20	1.20	1.10	1.10
No. 5 slack	.....	.70	.95	.70	.70

CHICAGO

Chicago steam purchases heavy. Domestic consumption very slow. Anthracite and smokeless dull.

From a well authenticated source it is understood that prices for Franklin and Williamson County coal for July and August shipment will be quoted on the following basis:

	July	August		July	August
Lump	$1.65	$1.75	No. 5½ in.	$0.75	$0.75@0.80
Egg, 6x3 in.	1.65	1.75	2x1½ in.	.90	.90@1.00
No. 1 nut	1.65	1.75	¾ in.	.85	.85@ .90
No. 2 nut	1.50	1.60	Mine run	1.25	1.25@1.35
No. 3 nut	1.35	1.35			
No. 4 nut	1.35	1.35			

Increased ordering of Southern Illinois domestic sizes over a wide territory is reported by shippers. Screenings and all fine sizes are in brisk demand while the steam demand for Southern Illinois sizes is decidedly the best for several summers. Increased orders from country dealers are being booked ahead, and it is expected that a quickening movement will occur next week to take advantage of the June prices.

All Springfield steam sizes have been well taken, an increased tonnage having been shipped to Chicago and Iowa points this week. The domestic demand is still nil.

June has been a strong month for Indiana steam trade. Screenings are averaging well around the dollar mark. Heavy shipments of No. 4 steam tonnage have been coming into Chicago this week and there has been some domestic demand for threshing coal. Mines are operating on an average of four days per week.

Anthracite trade is quiet, but next week shippers are looking for increased ordering. Dealers are not carrying a large amount of anthracite at the present due to the fact that the public is not in the market.

Some of the Chicago docks are worrying about their future supplies. Shortages of Lake bottoms may result in their having to move tonnage mostly by rail, which means slow transportation, lack of coal when wanted, and trouble with their customers.

Quotations in the Chicago market are as follows:

	Williamson and Franklin Co.	Springfield	Carterville	Clinton	Knox and Greene Cos
Lump	$1.45@1.55	$1.35@1.50	$1.40@1.55	$1.40@1.50	$1.50
Steam lump	1.45	1.25@1.30	....	1.30@1.35	1.30@1.35
2½ and 3-in. lump	....	....	....	1.50@1.55	1.35@1.40
1½-in. lump	....	....	....	1.45@1.50	....
Egg	1.45@1.55	1.25	1.35@1.50	1.40@1.50	1.40@1.50
Nut	....	1.15@1.25	....	1.35@1.45	1.25
No. 1 washed	1.50@1.60	....	1.50@1.60	....	....
No. 2 washed	1.40@1.50	....	.90@1.00	....	....
No. 1 nut	1.45@1.55	....	....	....	....
No. 2 nut	1.40@1.45	....	....	....	....
Mine-run	1.25	1.10@1.15	1.15@1.25	1.10@1.15	1.15
Screenings	.90@1.00	.90@ .95	....	.90@ .95	.90@ .95

	Harrisburg & Saline Co.	E. Kentucky	Pocah. & W.Va.Smok'l.	Penna. Smokeless	Hocking
Lump	$1.45@1.55	$1.60@1.90	$1.75@1.90	$1.60@1.75	$1.70@1.75
1½-in. lump	1.45@1.50	....	....	....	1.40@1.50
Egg	1.45@1.55	1.25@1.60	1.60@1.90	1.50@1.65	1.50@1.60
Nut	1.45@1.55	1.15@1.25	1.35@1.45	1.25@1.35	....
No. 1 nut	1.45@1.55	....	....	....	....
No. 2 nut	1.45	....	....	....	....
Mine-run	1.25	1.05@1.25	1.15@1.25	1.15@1.25	1.15@1.25
Screenings	.90@ .95	.85@.95	....	....	....

Kanawha splint lump, $140-160.

PRODUCTION AND TRANSPORTATION STATISTICS

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P.R.R. Co.'s lines east of Pittsburgh and Erie for May and the five months of 1915 and 1916, in short tons:

	May		Five Months	
	1916	1915	1916	1915
Anthracite	957,091	972,995	4,952,149	4,580,414
Bituminous	3,926,050	3,393,328	20,524,490	16,597,074
Coke	1,229,440	872,181	6,162,191	4,008,443
Total	6,112,581	5,238,504	31,638,830	25,185,931

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts in May and the eleven months of the fiscal years 1915 and 1916, in short tons:

	May				Eleven Months			
Destination	1916	%	1915	%	1916	%	1915	%
Tidewater	472,821	19	429,466	22	4,770,168	20	3,468,015	18
East	202,730	8	168,463	9	2,524,365	10	2,212,044	12
West	1,636,287	64	1,184,105	62	14,705,006	61	12,343,472	65
Total	2,311,838		1,782,034		21,999,539		18,023,531	
From Connections								
Bituminous	232,256	9	129,281	7	2,113,426	9	1,061,176	5
Anthra. (local)	30		99		1,557		751	
Anthracite	718		1,268		12,458		13,179	
Total	2,544,842	100	1,912,682	100	24,126,980	100	19,098,824	100
Coke	48,245		21,803		429,555		178,220	

IMPORTS AND EXPORTS

The following is a comparative statement of coal imports and exports of the United States for April, 1915-16, and for the 10 months ending April, 1914-15-16, in long tons:

	April		Ten Months		
Imports	1915	1916	1914	1915	1916
Anthracite, total	173	34	1,016	12,305	7,199
Bituminous, total	137,721	147,792	[1]1,206,721	1,221,749	1,408,457
United Kingdom	3,012	1,273	10,133	32,962	7,671
Canada	116,632	136,464	882,772	959,072	1,244,659
Japan	4,729	9,980	83,441	72,980	70,400
Australia	13,027	75	226,945	154,907	84,031
Other countries	321	.....	3,430	1,828	1,696
Coke	642	7,766	[1]89,091	80,342	51,047
Exports					
Anthracite total	453,527	213,593	3,050,366	2,906,858	2,907,870
Canada	445,118	203,961	3,000,205	2,856,521	2,792,183
Argentina	.....	995	.....	212	2,926
Brazil	18	.....	.....	24	2,472
Uruguay	.....	.....	84	.....	600
Other countries	8,391	8,637	50,077	50,101	109,689
Bituminous total	1,112,668	1,328,607	13,435,587	11,075,308	14,785,504
Italy	253,273	209,557	.....	960,233	2,406,073
Canada	381,223	745,432	9,972,979	6,962,352	7,948,969
Panama	42,946	12,000	314,467	261,343	397,600
Mexico	32,966	19,765	259,575	338,919	183,737
Cuba	101,013	95,174	965,528	882,572	1,016,871
West Indies	55,055	38,129	481,284	379,015	494,976
Argentina	79,531	93,382	118,354	297,328	576,087
Brazil	66,582	49,287	212,668	339,597	510,371
Uruguay	36,503	7,713	44,671	77,270	107,227
Other countries	63,576	58,168	1,066,061	576,679	1,143,593
Total coal	1,566,195	1,542,200	16,485,953	13,982,166	17,693,374
Coke	56,113	92,070	658,670	459,264	803,838
Bunker coal	655,465	579,502	6,449,722	5,686,855	6,072,216

[1] Part year only.

FOREIGN MARKETS

GREAT BRITAIN

June 14—Irregular conditions continue in the steam coal trade. Tonnage is still somewhat scarce and coals not reserved by the authorities are more easily obtainable. Quotations are approximately as follows:

Best Welsh steam	Nominal	Best Monmouthshires	$11.76@12.00
Best seconds	Nominal	Seconds	11.52@11.76
Seconds	$11.76@12.00	Best Cardiff smalls	6.90@ 7.20
Best dry coals	9.60@12.00	Cargo smalls	4.80@ 5.40

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

Freights—Chartering is still slow and rates are approximately as follows:

Gibraltar	$8.40	Naples	$20.00	St. Vincent	$10.80
Marseilles	18.96	Alexandria	22.80@24.00	River Plate	11.40
Algiers	..	Port Said	22.80@24.00		
Genoa	20.00	Las Palmas	10.20		

Exports—British exports for May and the five months of the past three years were as follows:

	May			Five Months		
To	1914	1915	1916	1914	1915	1916
Russia	533,074	10,735	1,690	1,304,074	16,139	1,690
Sweden	380,550	320,812	181,270	1,408,560	1,342,375	666,346
Norway	214,900	235,309	217,310	1,095,443	1,156,418	921,940
Denmark	255,938	264,761	211,570	1,169,560	1,255,985	1,017,540
Germany	811,720	.....	.....	3,378,673	.....	.....
Netherlands	156,244	108,854	106,322	708,952	649,038	468,182
Belgium	145,417	.....	.....	739,801	.....	.....
France	1,083,502	1,516,157	1,674,387	5,852,799	6,914,199	6,983,089
Portugal[1]	82,725	81,810	82,795	547,420	446,940	423,876
Spain[4]	252,185	187,173	173,436	1,503,304	893,783	878,884
Italy	849,177	446,608	455,620	3,900,684	2,669,021	2,207,174
Aus. Hung.	74,046	.....	.....	378,272	.....	.....
Greece	54,755	36,618	21,415	307,468	187,043	84,448
Roumania	55,533	.....	.....	131,206	.....	.....
Turkey	31,816	3,484	.....	249,191	6,557	.....
Algeria	125,467	93,963	72,088	535,389	445,014	365,192
Portugal[5]	2,077	28,933	18,746	88,735	102,068	105,211
Chile	84,105	154	737	268,170	22,133	12,313
Brazil	103,761	51,175	30,547	591,307	309,230	151,651
Uruguay	86,014	25,277	29,176	324,274	184,227	152,527
Argentine	291,307	144,211	86,444	1,615,571	883,102	536,708
Channel Is.	15,932	8,778	8,529	66,817	53,527	41,809
Gibraltar	10,658	23,380	32,355	156,103	157,848	212,908
Malta	27,162	15,676	6,159	207,528	57,471	29,800
Egypt[3]	278,325	102,420	72,976	1,425,024	619,932	296,071
Aden[3]	16,449	13,561	.....	79,861	60,402	5,908
India	31,043	939	107	98,002	12,110	8,722
Ceylon	23,375	14,390	498	146,599	31,521	13,354
Miscell'ous.	131,074	50,616	74,028	573,931	289,201	224,425
Coke	75,082	61,299	125,295	444,446	366,996	604,673
Briquettes	186,050	120,564	141,887	852,326	509,471	586,296
Total	6,469,463	3,967,657	3,825,387	30,149,490	19,651,751	17,000,732
Bunker	1,840,950	1,180,147	1,231,537	8,500,680	6,334,542	5,467,575

[1] Includes Azores and Madeira. [3] Including Anglo-Egyptian Sudan. [3] And dependencies. [4] And Canaries. [5] West Africa.

Note—The figures in the above table do not include Admiralty and certain other shipments.

Financial Department

New River Coal Co.

This company reports for the fiscal year ending Mar. 31, 1916, as follows:

Production—During the year our subsidiary companies produced a total of 1,893,816 gross tons of White Oak New River smokeless coal, an increase of 282,389 tons at a reduced cost of 7c. per gross ton, resulting in earnings sufficient to pay the interest on outstanding bonds and notes, leaving a surplus for the year of $18,602.

From April to June, 1915, tonnage was greatly reduced, and costs consequently increased, the production falling off in June to 115,556 tons. Opportunity, however, to run nearly to our maximum capacity in July, August and September resulted in three comparatively good months, reaching a total of 191,353 tons in August, and making a correspondingly good showing in each of the other two months. Shortage of business again occurred in October, November and December, followed by an increased demand for coal from January to March, during which period we suffered from car shortage, our lowest cost-producing mines receiving less than 50% car supply.

Improvements—All of the Virginia power equipment has been installed and beginning with May 1 there will be no charge for fuel coal, everything being operated with current from the Virginia Power Co.

A steel tipple at Oakwood, with modern screening equipment, was completed about Oct. 1, 1915. New screening equipment was added at Lochgelly, Summerlee and Harvey. These three tipples, property equipped for preparation of coal, together with Oakwood, Scarboro and Dunn Loop, give us six mines with modern screening equipment, and place us in position to make the best-prepared coal that goes into the market.

Skelton Mine—The opening of this mine is now practically completed, and we should begin producing coal from this mine some time during May. It will afford the second opening to the Cranberry mine required by law.

A connection has been completed to the Kanawha, Glen Jean & Eastern Ry., which will give us the advantage of Virginian cars at Dunn Loop mine.

Markets—Marketing the coal has been a big problem. While we disposed of 1,893,816 gross tons of coal, we were equipped to produce 2,400,000 tons. Our selling price dropped practically 5c. per ton. The situation at tidewater during the year was unsatisfactory, due to the unusually high rates on ocean-going as well as as coastwise vessels. The uniform bunker price at Hampton Roads was reduced 20c. per ton, and we had to follow the lead to retain our business.

In the Washington territory, our Inland East territory, we did not show an increase in business, competition being very strong in this territory, and our efforts to get more of the Southern business through the office established in Richmond has not been very successful.

In the Chicago territory, on the other hand, we have been quite successful, and in the territory outside of Chicago our prepared-coal sales have increased materially, particularly in Iowa and Wisconsin. In the Indianapolis territory we have made splendid headway and have greatly increased our tonnage. A great deal of coal is handled in the Toledo territory by jobbers, but we have materially increased our sales in that district, particularly since Jan. 1. Our shipments to the lakes exceeded any year in the history of the company.

Reduction of Capital Stock—The time for converting bonds into the common stock of the company having expired Jan. 1, 1915, a portion of the stock held by the trustees for this purpose was retired. This, together with the action taken by the stockholders in response to circular of June 12, 1915, resulted in the outstanding common stock being reduced from 182,498 shares to 44,498 shares, and the outstanding preferred stock reduced from 112,374 shares to 90,374 shares, making the present outstanding and issued stock as follows: (1) 73,679 shares preferred and 40,173 shares common issued to stockholders; and (2) 16,695 shares preferred and 4,325 shares common in hands of trustees.

Sale of Bonds—In accordance with circular dated Oct. 27, 1915, 1,176 bonds were sold, and, out of the proceeds of same, outstanding notes for $582,500 were paid, the balance of proceeds being added to the working capital. There are now outstanding, as of Mar. 31, 1916, 3,797 bonds, par value, $3,797,000.

Prospects for 1916—With market conditions and prices so uncertain, any estimate of the year's business is of little value; however, we are striving for a production of 2,400,000 gross tons.

OUTPUT AND EARNS. OF SUBSIDIARY OPER. COS. AND AMOUNT THEREOF BELONGING TO NEW RIVER CO., YRS. END. MAR. 31

	Output (Tons) 1915–16	Output (Tons) 1914–15	Total Net Profits 1915–16	Total Net Profits 1914–15
White Oak Fuel Co.	431,514	372,030	loss $55,309	loss $30,458
New River Fuel Co.	.....	.....	4,184	20,823
Collins Colliery Co.	86,382	106,601	13,960	29,622
Macdonald Colliery Co.	60,589	68,533	542	4,224
Cranberry Fuel Co.	276,927	194,508	1,985	loss 9,331
Dunn Loop Coal & Coke Co.	259,078	200,546	95,978	66,611
Harvey Coal & Coke Co.	219,422	169,263	62,206	48,295
Beckley Coal & Coke Co.	100,880	86,859	loss 10,600	loss 12,373
Prudence Coal Co.	134,737	139,959	3,641	19,309
Mabscott Coal & Coke Co.	85,501	98,410	13,263	27,465
Price Hill Fuel Co.	.....	.....	loss 4,198	loss 5,783
Stuart Colliery Co.	238,786	174,718	loss 46,107	loss 39,947
Great Kanawha Collieries Co.	.....	.....	loss 540	loss 575
White Oak Coal Co.	.....	.....	37,025	2,557
White Oak Railway Co.	.....	.....	1,112	1,353
Piney River & Paint C'k R.R.	.....	.....	14,875	14,461
Total	1,893,816	1,611,427	$132,017	$136,253
	1915–16	1914–15	1913–14	1912–13
New River Co. proportion of profit and losses of oper. cos., net	prof. $119,383	prof. $127,174	prof. $46,255	loss $120,676
New River Co., losses for year	100,780	109,636	103,677	91,239
New River Co., net gain or loss (see text above)	gain $18,602	gain $17,538	loss $57,422	loss $211,915

There was charged off for depreciation $82,438 in 1915-16, against $75,226 in 1914-15, $57,445 in 1913-14 and $84,797 in 1912-13, and also, in 1912-13, $11,251 for plants impairment.

NEW RIVER CO.—BAL. SHEET MARCH 31

Assets	1916	1915	Liabilities	1916	1915
Inv. in sub. cos.	$13,333,143	$19,683,343	Common stock	$4,449,800	$18,249,800
Properties and rights owned in fee	1,473,929	1,764,354	Preferred stock	9,037,400	11,237,400
Treasury stock	1,650,900	9,275,000	Bonds outstanding	3,797,000	3,841,000
Sundry investments	25,513	25,642	Notes payable	396,094	699,785
Cash and accounts rec.	8,760	6,367	Accrued interest	45,567	34,844
Notes receivable	232,672	.....	Accrued taxes	4,163	2,680
Bonds in treas.	81,000	x1,341,000	Miscellaneous items	42,009	36,040
Miscellaneous	42,200	32,975	Depreciation reserve and accounts payable	11,788	9,144
Loans to sub. cos.	1,668,529	1,117,616	Profit and loss, surp.	732,825	.....
Profit and loss	.....	864,396			
Total	$18,516,645	$34,110,693	Total	$18,516,645	$34,110,693

x Includes bonds in treasury and as security on notes.

The investments in subsidiary companies were: Stocks aggregating $14,807,072 on Mar. 31, 1916, against $21,447,697 in 1915 (see list Mar. 31, 1912, Vol. 96, p. 946); and loans to subsidiary companies, $16,475,600 in 1916, against $22,565,313 in 1915.

CONSOLIDATED BALANCE SHEET OF SUB-COMPANIES MAR. 31

Assets	1916	1915	Liabilities	1916	1915
Plant	a$6,520,877	$6,019,752	Capital stock	$5,745,400	$5,745,400
Inter-co. receivables	1,309,965	764,962	Due New River Co.	1,832,074	1,445,992
Mdse., feed, furn., etc.	399,340	402,384	Inter-co. payables	1,309,965	764,962
Acc'ts receivable	345,702	305,507	Acc'ts payable	394,585	359,267
Notes receivable	13,531	126,210	Notes payable	158,862	343,788
Due from New R. Co.	163,546	328,375	Pay-rolls	64,212	42,156
Cash	35,565	43,840	Miscellaneous	72,808	48,815
Coal in transit	76,917	124,107			
Miscellaneous	229,528	161,088			
Profit and loss	482,933	474,155			
Total	$9,577,905	$8,750,380	Total	$9,577,905	$8,750,380

a After deducting reserve for depreciation, $458,752.

Note—For previous annual report of this company see Vol. 8, p. 872.